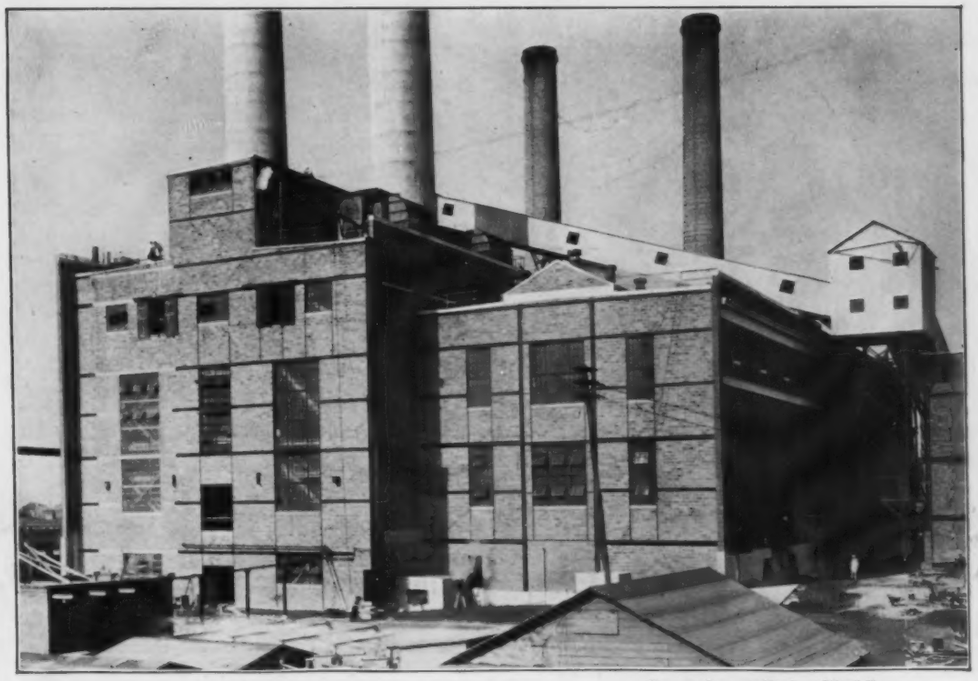
Electrical West

With which is consolidated the Journal of Electricity

A McGraw-Hill Publication | January 1, 1928 | Twenty-five Cents Per Copy

833
3434
W



Reeves Avenue Station, Norfolk
40,000 H. P. Addition and Improvements

More Power *for* Virginia Electric & Power Co.*

Extending and modernizing power stations usually must be done while stations are operating. This work, requiring both extensive operating and long construction experience, is an important part of Stone & Webster service.

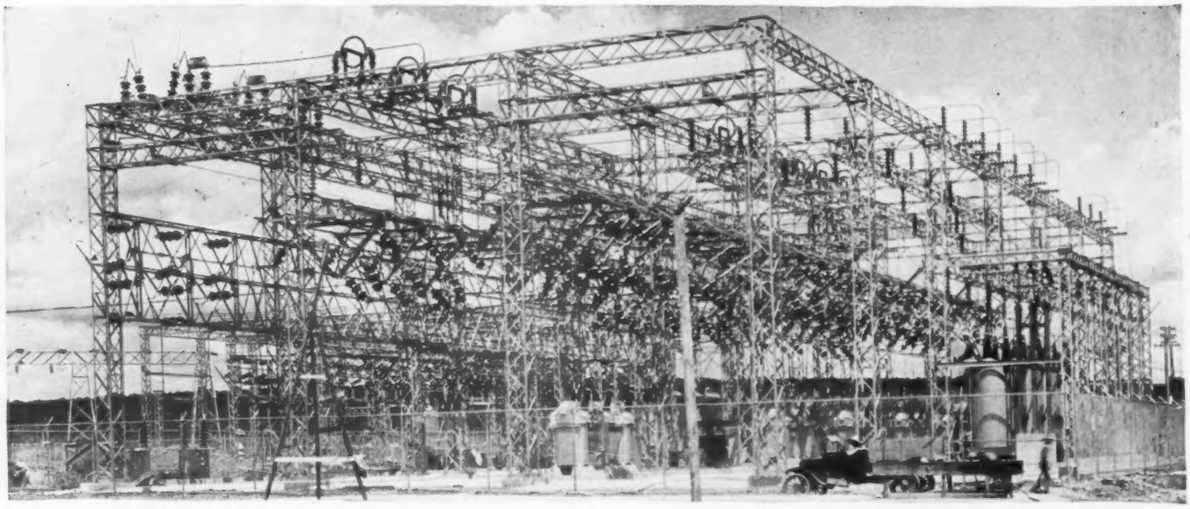
*Serves Tidewater Virginia and Northeast North Carolina.

STONE & WEBSTER
INCORPORATED

DESIGN-BUILD
OPERATE
FINANCE

BOSTON, 49 Federal Street
NEW YORK, 120 Broadway
CHICAGO, First National Bank Bldg.
PITTSBURGH, Union Trust Bldg.
SAN FRANCISCO, Holbrook Bldg.
PHILADELPHIA, Real Estate Trust Bldg.

Starting from here—Elpeco.



A Tip from Texas

This substation, owned by the San Antonio Public Service Company of San Antonio (The Miami of Texas) was designed and built by the U. G. I. Contracting Company, Engineers, of Philadelphia, Pa.

While the present capacity is 30,000 Kva., provision was made for an ultimate of 120,000 Kva. In designing this station 132,000 volts insulation and spacing was used. though the present operating voltage is 76,200 delta.

This was done so that when higher voltage is required, it can be obtained.

Power is supplied from New Braunfels, a suburb, to the city of San Antonio, the reliability of which depends in part on Elpeco Horn Gap and Group Operated Disconnecting Switches on the primary side.

For the good of the Service

L. P. Cox

ELPEC

ELECTRIC POWER EQUIPMENT CORPORATION

412-420 NORTH EIGHTEENTH ST. PHILADELPHIA, PA.

Western Representatives: C. E. INGALLS, Rialto Bldg., San Francisco, Calif.
EICHER & BRATT, 570 Colman Bldg., Seattle, Wash.

Electrical West entered as second class matter at the post office at San Francisco, under the Act of Congress, March 3, 1879. Published at 883 Mission Street, San Francisco, California, thirteen times a year as follows: January 1, February 1, March 1, April 1. May 1, May 15, June 1. July 1, August 1, Septe mber 1, October 1, November 1 and December 1.

JAN 14 '28
©Cl B762872

Volume 60 San Francisco, January 1, 1928 Number 1

Electrical West

With which are consodidated the "Electrical Journal," the "Journal of Electricity, Power & Gas," and the "Journal of Electricity"

C. T. HUTCHINSON, *Editorial Director*
W. A. CYR, *Associate Editor*
G. R. HENNINGER, *Associate Editor*

A McGraw-Hill Publication
Established 1887

G. C. TENNEY, *Managing Editor*
E. J. KNOWLTON, *News Editor*
B. H. SNOW, *Northwest Editor*

Contents

Editorial 1

A Message for the New Year—Greetings From a Commercial Manager to His Staff—Difference in Depreciation Would Buy and Maintain Appliances—Long Beach Finds Municipal Gas Business Expensive—Evolution, Fundamentalism and Industrial History—Why Not "Merchandising Research Laboratories"?—Genealogy of Electrical West.

Airway and Airport Lighting 5

Announcement of Department of Commerce that Western airways are to be lighted makes this discussion of the technique of airway and airport lighting of particular interest at this time.

New Street Lighting Developments 9

Recent advances in street lighting technique and practice as illustrated by installations in several California cities are described in this comprehensive article.

Cost Data for Complete Electrical Hospital Installation 13

Attention Turns to Highway Lighting 14

A description of highway lighting installations already made in Coast states shows that these installations may serve as guides for more extensive projects soon to be undertaken.

More Light on the Present Electric Water Heater Situation 15
By S. B. HOOD.

Further discussion of the subject of low-wattage versus high-wattage water heaters by an engineer who has conducted extensive water heater tests for a central station company.

Electric Ventilation—A Market Worth Developing 16
By ANDREW G. OREAR.

Market possibilities for all types of electric ventilating equipment are discussed by an engineer of one of the large manufacturing companies in a manner to show that the industry is overlooking many sales possibilities.

"Be It Ever So Humble"—and All That Sort of Thing 19
By C. T. HUTCHINSON.

Some thoughts on what electricity is doing to make the home more livable.

Taking the Guess Work Out of Range Advertising 20
By J. B. BUMAN.

Some interesting results secured in a survey among non-range users in an attempt to discover what customers knew and did not know about electric ranges so that future advertising space might be utilized with greater effectiveness.

Survey Shows Use of Appliances by Power Company Employees 21

Engineering Practice 22

Uniform Design for 33-kv. Stations Effects Economies 22
Collapsible Forms Used for Lining Canal 24
Synchroscopes Now Operated by Vacuum Tubes 25
Analysis of Current Transformer Tests—IX 26
Chart for Power Factor Determination 28
Economical Rural Line Construction 29

Ideas for the Contractor 30

"Old Man Overhead" Is Under Investigation 30
Smaller Communities Show Rapid Advance Electrically 32
"Safety Circuits"—What They Are and How Used 34
Electric Ventilation for Restaurants and Stores 36

Better Merchandising 38

New Business Along Old Lines 38
Neon Lighting Adaptable to Many Advertising Uses 40
Moving Pictures Sell Electric Refrigeration 42

News of the Industry 46

Contractors, Dealers and Inspectors 53

Meetings 55

Personals 56

Manufacturer and Distributor 58

New Equipment 60

Industrial Barometer 62

McGRAW-HILL COMPANY OF CALIFORNIA—883 Mission St., SAN FRANCISCO
Northwest Office: 1206 Spalding Building, Portland, Ore.
Publishers of ELECTRICAL WEST

JAMES H. McGRAW, Chairman of the Board
C. T. HUTCHINSON, President
EDGAR KOBAK, Vice-President
ROY N. PHELAN, Secretary and Treasurer

WASHINGTON, Colorado Building
CHICAGO, 7 South Dearborn Street
PHILADELPHIA, 1600 Arch Street
CLEVELAND, 401 Guardian Building
ST. LOUIS, Southwestern Bell Telephone Bldg.
NEW YORK, 285 Madison Avenue

McGRAW-HILL PUBLISHING COMPANY Inc.
New York

Publishers of

Industrial Engineering Electrical Merchandising
Chemical and Metallurgical Engineering Power
American Machinist Construction Methods
Electrical World Electric Railway Journal
Coal Age Engineering and Mining Journal
Bus Transportation Engineering News-Record
Radio Retailing Ingenieria Internacional
American Machinist—European Edition
(Published in London)

Member Audit Bureau of Circulations. Associated Business Papers, Inc.
Circulation of this issue, 6,450.

Copyright, 1927, by McGraw-Hill Company of California

Subscription rates in United States, Canada, Mexico, Porto Rico, U. S. Possessions, Argentina, Bolivia, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, Nicaragua, Panama, Guatemala, Paraguay, Peru, Honduras, Salvador, Uruguay, and Spain, $2.00 per year, 2 years, $3.00. Elsewhere $3.00 Gold (13 Shillings). Single copy, 25c. When change of address is required, both old and new addresses must be given. Notice must be received two weeks before change takes place.

Entered as second-class matter at the Post Office at San Francisco, under Act of March 3, 1879. Published thirteen times a year as follows: January 1, February 1, March 1, April 1, May 1, May 15, June 1, July 1, August 1, September 1, October 1, November 1, December 1.

Printed in U.S.A.

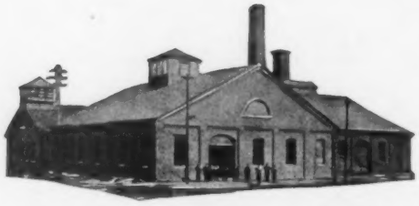
"MODERN" PLANTS

True as in 1894

STONE & WEBSTER, Inc., built a station in 1894. An account, "A Modern Power Plant," contains these words:

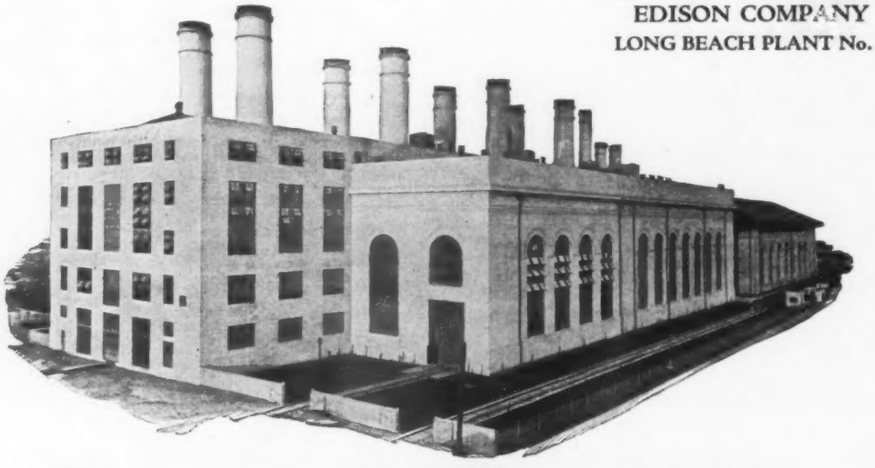
> A complete mechanism, every part designed to work with every other part ... in case of accident to any member, some other can perform its duty ... energy put on the line surely and cheaply ... must be no shutdowns, either steam or electrical ... every device and arrangement a good investment ... constructed and equipped under constant supervision and care.

Written when 2000 kw. was an important installation, this remains a good description of Stone & Webster power work. It shows the sound early foundation on which rests the experience offered Stone & Webster clients today.



INDUSTRIAL IMPROVEMENT COMPANY
OF BOSTON
OLD ALLENTOWN, PA., PLANT

SOUTHERN CALIFORNIA
EDISON COMPANY
LONG BEACH PLANT No. 2



STONE & WEBSTER
INCORPORATED

DESIGN · BUILD
OPERATE
FINANCE

BOSTON, 49 Federal Street
NEW YORK, 120 Broadway
CHICAGO, First National Bank Bldg.
PHILADELPHIA, Real Estate Trust Bldg.
SAN FRANCISCO, Holbrook Bldg.
PITTSBURGH, Union Trust Bldg.

JAN14'28

Electrical West

With which is consolidated the Journal of Electricity

C. T. HUTCHINSON, *Editorial Director* — A McGRAW-HILL PUBLICATION — G. C. TENNEY, *Managing Editor*

Volume 60 — San Francisco, January 1, 1928 — Number 1

A Message For The New Year

WITH nineteen twenty-seven a closed book and nineteen twenty-eight before us as a volume with uncut leaves, tradition rules that this is the time for the exchange of greetings, for retrospection and for drafting good resolutions for the twelve months to come.

First, the exchange of greetings. ELECTRICAL WEST extends to its friends in the electrical industry its heartiest good wishes for a happy, a fruitful and a prosperous New Year. And as an earnest of its sincerity ELECTRICAL WEST pledges itself to a continued program of better service to the electrical industry of the West.

Glancing back over the record of the year just closed there is much to arouse pride and inspiration. While the year has not seen the complete consummation of the dream when the electrical industry will be welded into a harmonious whole, there is a growing spiritual union between the various branches of the industry. There has been more tolerance, less selfishness, a better and more sympathetic understanding of the problems of the different groups and a frank expression of willingness to lend a helping hand. Co-operative undertakings have grown in number and in fruitfulness.

Then there has been the realization by the executives of the industry of the importance of the commercial man and his problems. Executive support was not only promised but has been forthcoming. The power companies have realized that they have something to sell for which a market must be created in the only way that markets can be created, that is, by demonstrating the value of the service to the prospective user.

Public relations are better; there is little or no agitation for government participation in the business. There have been improvements in generating, transmission and distribution equipment. New fields for the application of electric energy have been developed that promise both better business for the utilities and better service to the consumer. In fact, even a cursory accounting of the year's activities shows that the industry has made good use of the opportunities that have been presented.

But what of the twelve months to come? Nineteen twenty-eight will be a presidential year, and tradition has established that a presidential year brings about a degree of uncertainty in the minds of industrial leaders. Granting that this *is* a presidential year, there is not a single sign to account for any expectation other than that business will be as good as, if not better than, it was in 1927. The farmer is more prosperous today than he has been for several years; industry is progressing soundly and sanely; unemployment is not below normal; *Engineering News-Record's* construction indices show a healthy condition in the building industry; figures on kilowatt-hour generation prove that power use is increasing at a satisfactory rate.

Certainly the opportunities for new business for every branch of the industry will be greater during the coming year than ever before. The determination to give the home the electric service that the industry can make available will mean work for manufacturers, central station commercial departments, jobbers and retailers. The same applies to relighting. In fact, business will be secured in proportion to the effort expended.

All of which leads to the conclusion that 1928 will be as happy and as prosperous as we make it, for ourselves and for one another.

HAPPY NEW YEAR!

Greetings From a Commercial Manager to His Staff

NINETEEN TWENTY-SEVEN is about gone and we are soon to be confronting a brand new year with three hundred and sixty-odd days to be devoted to work, play, and the distressed needy.

The play will take care of itself and we have the Community Chest to look after the needy. No one will look out for the work but us, and that is my chief concern.

Goodfellowship with its cheery stories and reminiscences of our performances on land and sea is entertaining and a guide to the uncertain and faltering steps of the youngsters who are about to embark on this life's sea of turmoil and uncertainty.

However, the youngsters and casual visitors are apt to be confused, the way made uncertain and their vision clouded if they are too often and too remotely led into the past experiences of those of us who have traveled.

It is even possible that we who cheer and counsel those around us may fail to remember that the past is gone, never to return, and that our real mission is the accomplishment of today and the constructive plan for tomorrow.

Let us beware the paths that lead into the pastures where only goat feathers are gathered and instead travel the highways and byways parallel to our own lines and do what we can to speed the revolutions of those little guardians of our revenue — the watt-hour meters.

We admit, without necessity of proof, our accomplisments of the past, but we have no record established for the future.

Automobile tires and shoe leather are materials for which we need make no accounting, but the depreciation reserve on office chairs is exhausted.

Happy New Year to you all, and let us be sure it is.

Jas

Difference in Depreciation Would Buy and Maintain Appliances

SINCE the placing of a new model of a motor car on the market has assumed something of the dignity of a national event, a thought projected at a recent Los Angeles Electric Club gathering by Dr. W. D. Moriarty, professor of economics of the University of Southern California, bears possibilities for not a little commercial development.

The idea Dr. Moriarty presented, briefly stated, is this! To the person about to buy an automobile in the $2,500 to $3,000 class, which would be in normal use for perhaps five years, the difference in the depreciation alone on such a car and that on one of the $1,000 class would be sufficient to buy and maintain a full household of electrical appliances, including range, water heater, refrigerator and washing machine, during the same period.

Surely this is a thought worth turning into sales. At first glance the idea seems preposterous until it is remembered that the depreciation on a $3,000 car is $1,500 for the first year and $200 for each succeeding year. This, over a full five-year period, is sufficient to buy and pay all operating costs on electric home equipment for the same period.

To refute the age-old argument as to the first cost of electrical equipment no more effective contrast could be imagined. Not only is the relative importance of car and home equipment visualized but the relative operative costs are brought sharply into focus—to the decided advantage of the home electric equipment.

Long Beach Finds Municipal Gas Business Expensive

THE City of Long Beach, which four years ago entered enthusiastically into the gas business, has discovered that municipal ownership as such is not all that it was expected to be. An unlimited supply of natural gas at 50 cents per 100 cu. ft. for domestic consumption was the promise held forth to the voters; but a report made to the city manager by Joseph M. Berkley, gas consulting engineer, shows conclusively that the more gas sold at this rate the more money the city loses.

In commenting on the report Mr. Berkley states, "I feel that in introducing this report it is only fair, as an engineer, to say that in all my experience I have never seen a gas department that has been so mishandled as this department of this city has been. If it were privately owned it would have been sold by the sheriff long ago." Mr. Berkley was employed by the new city administration at Long Beach to make a survey and study of the gas department.

"If Long Beach is unwilling to raise the rates and follow the recommended course, and rehabilitate the department, it would be better to sell the system to a private corporation," Mr. Berkley advised the City Council when he submitted his report.

This story has nothing to do with the electrical industry on the face of it, but in reality it furnishes some splendid food for thought. The City of Long Beach has been possessed of a municipal ownership complex for several years, and rumors have been heard at times that it would like to own its own electrical distribution system. Mr. Berkley's report on the gas system should do much to clear the atmosphere of the municipal ownership germ, not only in Long Beach but weherever the facts are given publicity.

Evolution, Fundamentalism and Industrial History

EVOLUTION and not fundamentalism is the ruling doctrine of this modern age, the opinions of the late-lamented Mr. Bryan and his less spectacular successor, Dr. John Roach Stratton, to the contrary notwithstanding. Industrial history is replete with proofs in support of this contention. Not only have so-called fundamentalists or reactionary men been swept aside by the rush of progress, but time-honored processes that "nothing could ever supplant" have been replaced by revolutionary methods and machines that have been devised by science. Speed, economy, greater service or a better product have been the demands of progress with the result that the new has been, and is, constantly replacing the old.

The life story of electricity is filled with incidents that illustrate this point. Take, for instance, the application of heat to the preparation of food. A hundred years ago our forefathers cooked with wood in crude stoves. When a progressive Pennsylvanian attempted to prove the merits of coal, he was classed as a heretic for trying to burn "rocks." Oil met with a similar resistance. When a scientist advanced the theory that it was more economical to burn coal and oil in large central plants and pipe the resulting gas to individual homes for use, there was laughter and scoffing. Today the electric range is in the ascendency, and it is a short-sighted man who will deny that electricity will provide the heating for cooking the food of tomorrow. So industrial history runs. The fireplace supplanted the open fire; a stove replaced the fireplace; coal took the place of wood; gas substituted for coal; and today electricity is superseding gas.

But generalities, without proof, are almost meaningless. As a sample of the handwriting that is appearing on many walls, the following outline of conditions in one of several Pacific Coast cities where the story of the superiority of electric cookery is receiving ample publicity, is given for what it is worth. The electric utility sells electric ranges; the gas utility, gas ranges. Both engage in periodical campaigns. In the last three years the number of electric ranges sold has increased more than 100 per cent. Last year the number of gas stoves sold by the gas company dropped off 10 per cent. During the year just concluded gas range sales declined 30 per cent.

If the moral is not obvious, we offer the suggestion to any doubting industrial fundamentalist that he give up his gas range and go back to the old wood stove.

Problems in Airway and Airport Lighting

WITH THE development of commercial aviation it was obvious that the airplane would be a factor in the affairs of the electrical industry just as in any other business. Aerial photography and mapping have been successfully applied; the advantages of air mail are recognized and used. However, the determination of the government that an airway to be utilized to its fullest efficiency must be lighted to provide for night flying, has brought the subject directly to the attention of every branch of the industry. Electrical manufacturers must design and build the necessary lighting equipment; its installation is a job for the electrical contractor; central stations in many instances must furnish the service for lighting beacons and illuminating landing fields.

The progress in the art of airway and airport lighting is discussed fully in an article in this issue. The article shows that much of the preliminary work has been com-

pleted. Equipment is available from a number of manufacturers for lighting both airways and airports. There are a few minor refinements to be worked out, such as the elimination of glare in some of the landing lights.

The central stations providing service for this newest lighting development still have some problems to work out. There is the question of rates to be charged for this service. Conceivably a type of rate similar to those charged for street lighting should be devised. The application is almost the same, the difference being that, instead of lighting streets and highways for traffic purposes, airways are lighted.

There is one problem, however, particularly here on the Pacific Coast, toward which the entire industry might well turn its attention, namely the provision of beacons that, day or night, will plainly mark the location of a landing field for the aviator during heavy fogs. Tests have been made with beacons using lights containing neon and other inert gases that give off an orange or red light. These tests show that visibility is increased but not sufficiently so to enable the light to be seen through such fogs as are encountered along the Pacific Coast. It would appear that the application of the radio beacons used during the army's successful flight to Hawaii may provide the answer. It is known that fog offers no resistance to radio waves. The problem is to adapt these radio emanations in a manner that will be both simple and practicable. The entire subject is of such recent origin that an immediate solution is not to be expected. It is conceivable that within a short period flying through fog will be no more hazardous than present night flying during clear weather.

Why Not "Merchandising "Research Laboratories"?

"AS a student of merchandising . . . " said Richard Neustadt, addressing the Commercial Section conclave of the P.C.E.A. in San Francisco recently, and the thought suggests that perhaps there is a science and an art to the selling of merchandise.

Certainly the speaker indicated as much in concrete references to some of the basic fundamentals for true merchandising. The safety factors to be considered in time payment extension; the rules for determining to what extent credit may be granted to a customer; the ramifications of "mark-up" for overhead and profit, and the pitfalls the unwary may strike in chasing the rainbow of "volume," all suggest that there is more to merchandising than placing goods on sale and trusting to luck.

No power company would undertake to build a hydro plant, extend a transmission line or even erect a warehouse without careful and painstaking engineering inquiry into all the factors governing such works. And yet many will launch a selling campaign with only the most elementary preparation and without particular regard for selling principles, and expect it to pay "just because the power company is doing it," as Mr. Neustadt charged.

Is it because the sales staff has been recruited from an engineering establishment? Surely an engineer should seek to find the underlying principles, the working formulas of selling, even as with any engineering problem he might attempt to solve. Hasn't the matter of merchandising been carelessly and somewhat smugly entered into, as if to say: "Sell a few hundred appliances? Easy. There's nothing to selling, really. All you've got to do is . . . . "?

It would seem that there is something to it after all. It would seem, too, that selling is an important enough factor in the extension of electrical service to warrant a genuine study of the art. A power company will pay a man's salary and expenses and send him over the world any place to bring back to it concrete data on protective equipment for its power system. It will establish and maintain elaborate research laboratories and staffs to study and plan improvements to its physical equipment.

With a realization that selling, both of energy and the appliances which apply that energy to useful ends, must be regarded seriously if the industry is to develop beyond the present low saturation point, should come also an appreciation of the fact that genuine merchandising research is as necessary as technical research was to the physical development of the properties originally.

With the establishment of intelligent merchandising research the power companies then might cleanse themselves of the indictment Mr. Neustadt made, namely that central station merchandising has been "too ignorant," a charge that by means of evidence he presented, he very nearly, to use his own words, "made stick."

Genealogy of ELECTRICAL WEST

IN 1887 there was founded in San Francisco *Pacific Lumberman, Contractor and Electrician,* the electrical department of which was edited by George P. Low. As electrical development in California progressed it was deemed advisable to divorce the electrical department from the parent publication. This was done in July, 1895, and the new paper was called *Electrical Journal,* with Mr. Low as editor and publisher. To avoid confusion with *Electric Journal* founded at about this time by the Westinghouse Company in Pittsburgh, Pa., the name of the Pacific Coast paper was changed in September, 1895, to *Journal of Electricity.* The paper was brought out as a monthly under this title until July, 1899, when the name was changed to *Journal of Electricity, Power and Gas.* After the San Francisco fire of April, 1906, the Technical Publishing Company was organized and publication was changed to weekly and continued so to January, 1917, when the schedule was changed to semi-monthly publication. On January 1, 1919, the name was again changed, the paper reverting to the title, *Journal of Electricity.* In September, 1919, the paper was purchased from the Technical Publishing Company by the McGraw-Hill Company. On February 1, 1921, the McGraw-Hill Company of California was organized and the name of the paper changed to *Journal of Electricity and Western Industry.* It was found advisable to revert to the title, *Journal of Electricity,* on July 1, 1923. On January 1, 1927, the paper became ELECTRICAL WEST with a monthly publication schedule. The magazine has always been published in San Francisco.

Editorial policies of the paper, first as a department in *Pacific Lumberman, Contractor and Electrician,* and later as *Journal of Electricity,* were directed by George P. Low as editor until early in 1905. He was succeeded by C. L. Cory, dean of the College of Mechanics of the University of California, who held the position of editor until 1907. From 1907 until 1911 the paper was directed by A. H. Halloran as managing editor. In 1911 Robert Sibley became editor, a post he held until August 1, 1922, when he was made editorial director. Since January 1, 1923, C. T. Hutchinson has been editorial director and G. C. Tenney managing editor. In addition the present staff consists of W. A. Cyr, associate editor, G. Ross Henninger, associate editor, E. J. Knowlton, news editor, and B. H. Snow, Northwest editor.

Season's Greetings
to the Electrical Industry

Airway *and* Airport LIGHTING

Announcement of Department of Commerce That Western Airways Will Be Lighted Makes This Subject of Particular Importance to the Electrical Industry.

—*International Photo.*

FOR the maximum advantages of airplane service in the transportation of mail, express and passengers to be realized fully, both day and night flying must be maintained. Such continuous operation is only possible when every navigational aid, including the lighting of airways and airports, is provided. In line with the policy enunciated in the Air Commerce Act of 1926 the Airways Division of the Department of Commerce has announced a program of airway lighting in the Western states that includes the lighting of the Los Angeles-Seattle, Los Angeles-Salt Lake and San Francisco-Salt Lake routes. Such a program is of particular importance to the electrical industry since the central stations will be called upon to furnish service to beacons and emergency landing fields, manufacturers will supply a large amount of the required equipment and the electrical contractor will be furnished a new outlet for his knowledge and labor.

The program to be completed within the next year calls for the lighting of approximately 2,300 miles of airways. As shown in Fig. 1, the route from Salt Lake City east to Chicago is already lighted. A section of the Los Angeles-Salt Lake airway as far as Apex, Nev., has been completed recently, but winter snows have delayed the lighting of the San Francisco-Reno line until spring. Lights on this section have been installed as far as Auburn, Calif. Contracts have been let for the lighting of the Los Angeles-San Francisco route and another contract will shortly be let for lighting a section from San Francisco to Redding. The remainder of the lighting will be under way before July.

Features of Airway Lighting

The lighting facilities installed along an airway to permit night flying consist of illuminated intermediate emergency landing fields between airports spaced approximately thirty miles apart, and lighted beacons interposed between intermediate fields approximately ten miles apart. In addition to the electrically lighted beacons, flashing acetylene lights termed "blinkers" also are used to designate the airway. Fig. 2, a map of the Los Angeles-San Francisco airway, shows the relative locations of airports, intermediate fields, beacons and blinkers on this section of the coast route. The airway is assigned a designation based on the names of the terminal cities utilizing the initial letter of each city. This identification (in the case of the Los Angeles-Seattle airway, the letters "L-A-S") is displayed prominently at each beacon and intermediate field. In addition, each beacon and field is given a number based on a mileage system, the number being obtained by dropping the unit digit from the number of miles the given beacon or field is located from the specified terminal city. The blinkers also carry a mileage identification such as "ten-mile blinker," ten indicating that the blinker is ten miles from the first mentioned terminal of the airway.

For purposes of identification, the Division of Airways has adopted a standard designation for various classes of beacons depending upon the type, the nature of the electric service and other factors. These types are as follows:

"A" type beacon: A beacon operated by commercial power and automatically controlled by an astronomic clock or sun instrument and relay.

"B" type beacon: A beacon operated by direct current generated by a farm lighting set installed at or near the site and maintained by a caretaker.

"C" type beacon: Similar to "B" type beacon except that it is installed at an intermediate landing field that is outlined with boundary lights.

"D" type beacon: Similar to an "A" type beacon except that it is installed at an intermediate landing field that is outlined with boundary lights.

Each beacon consists of a 24-in., motor-driven, revolving searchlight and two 14-in. projectors or "course lights" set upon a 51-ft. fabricated steel tower. The

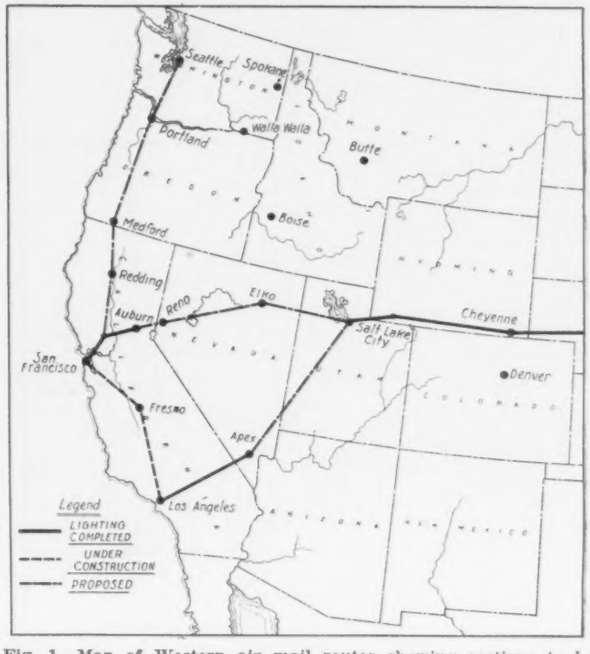


Fig. 1—Map of Western air mail routes showing sections to be lighted.

beacon uses a 900 or 1000-watt lamp and has a beam candle power of approximately 3,000,000. Eight million beam candle-power can be obtained by using a transformer giving 30 volts on beacons. The beams of the course lights point in the direction of the course. A mercury flasher mechanism is provided to produce the characteristic flash signals sent out by the lights. The standard speed of rotation of the beacon is 6 r.p.m. At "C" and "D" type beacons an illuminated wind cone also is attached to the side of the steel tower to indicate wind direction. Beacons are visible from the air for a distance ranging from 10 to 80 miles depending upon the weather. Fig. 3 shows the arrangement of a type "B" beacon.

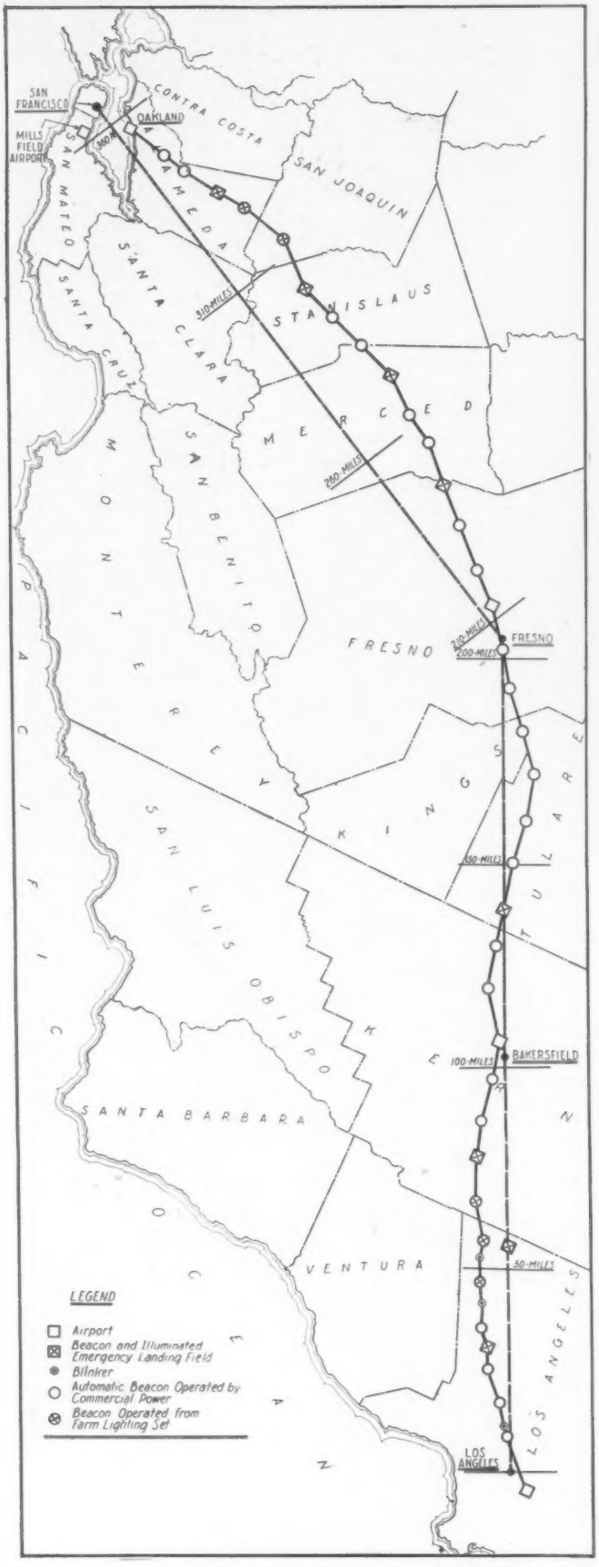


Fig. 2—Map of Los Angeles-San Francisco airway showing location of airports, intermediate fields, beacons and blinkers.

Fig. 3—"B" type beacon operated from farm lighting set. Course lights have not been installed on this beacon.

Directional arrows to indicate the course are constructed integral with the base of the tower. The tail of these arrows carries the course designation and the number of the beacon. A sketch of one of these arrows is shown in Fig. 4. Tests have shown that the best visibility is obtained with arrows painted a chrome yellow with black lettering.

Where central station power is not available two 2-kw. farm lighting sets are placed in a power house adjacent to the tower. A 515-gal. tank gives ample fuel capacity. For the present beacons so equipped will require an attendant, but it is hoped that within a short period it will be possible to make the operation of these beacons entirely automatic. Where power houses are necessary the roof is used as the tail of the directional arrow.

Emergency Field Lighting

At intermediate fields or "C" and "D" type beacons, an extensive system of boundary lights is required to outline the field and obstruction lights must be placed to designate the location of all power lines, trees, fences and other obstructions that would make landing hazardous. The recommended practice for installing boundary lights is to place them around the borders of the field at 200 or 300-ft. intervals, wiring them in either a series or multiple circuit. A series circuit is

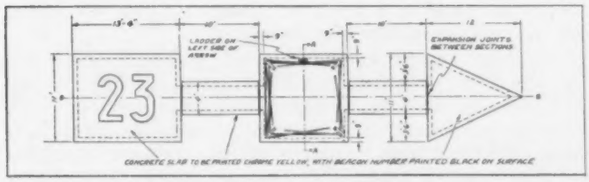

23
LADDER ON LEFT SIDE OF ARROW
EXPANSION JOINTS BETWEEN SECTIONS
CONCRETE SLAB TO BE PAINTED CHROME YELLOW, WITH BEACON NUMBER PAINTED BLACK ON SURFACE

Fig. 4—Sketch of directional arrow located at each beacon.

recommended for large fields with many lights. The specifications of the Airways Division call for the division of the lights into approximately equal parts with each half served by a separate multiple circuit. In the installation of the lights standard street lighting practice is followed with extreme care being used to keep moisture from lights, wires and cables so as to insure maximum reliability.

As shown in Fig. 5, the boundary light consists of a special street-lighting fitting equipped with a 10 or 25-watt lamp and globe mounted approximately 2 ft. 8 in. above the ground on 1-in. galvanized pipe. Manufacturers are producing a special boundary light that is acceptable to the government. The boundary lights nearest the line of best approach to the field are equipped with green globes, while the same fitting with a red globe is used to indicate obstructions. Obstruction lights are mounted on the top of the obstruction wherever possible. A boundary ground marker consisting of a 3-ft. circle of crushed rock, tamped and whitewashed, is placed around each boundary light to indicate its position in case of daylight landing. A wiring diagram for a "D" type beacon where central station power is available is shown in Fig. 6.

The installation of the lighting equipment along the airways is under the direct supervision of the Airways Division of the Department of Commerce, with headquarters at Washington. Upon the completion of each section the actual maintenance and supervision of the airways will be placed under the direction of the Lighthouse Service. The airways between Los Angeles and Apex, Nev., between Los Angeles and Redding, Calif., and between San Francisco and Reno, will be under the supervision of the superintendent of the eighteenth district with headquarters in San Francisco. The office of the seventeenth district in Portland will be charged with the operation of the airways between Redding, Calif., and Seattle. A new office of the Lighthouse Service has been opened in Salt Lake for the operation of the airways radiating from that city.

Airport Lighting

No provision is made in the Air Commerce Act of 1926 for the operation and lighting of airports as it is assumed that landing fields will be purchased, equipped and maintained by the various municipalities along the airways. Consequently, the subject of airports is outside the jurisdiction of the airways division. That municipalities recognize the importance of an airport as a civic asset is shown by the number of airports that have been placed in operation.

For example, California is now second of all states in the union in number of landing fields. There are 13 federal, 45 municipal, 30 commercial and 163 intermediate fields, or a total of 251 in the state.

In airport lighting some of the technique developed in street and flood lighting is employed. For the successful lighting of an airport the following requirements must be met:

1. There must be a beacon to indicate from a distance the location of the airport.
2. The outline or boundaries of the field must be

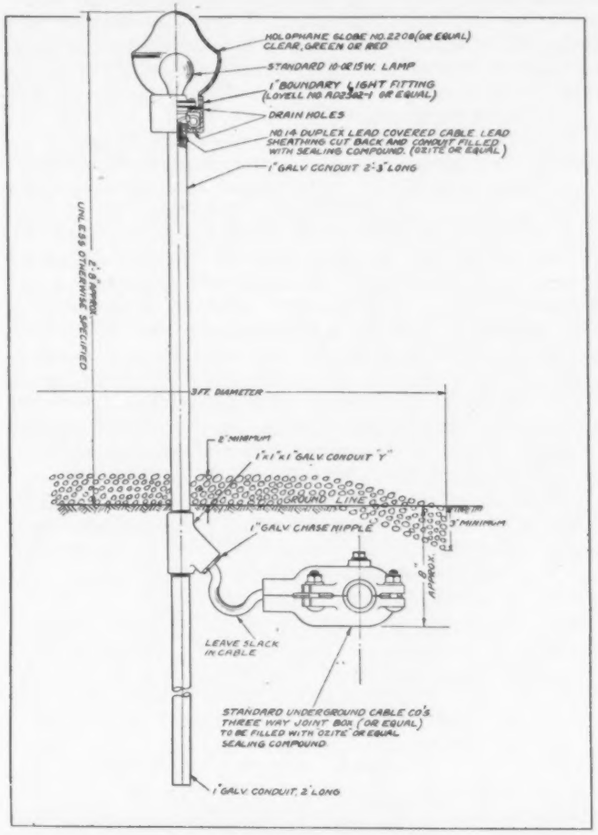

HOLOPHANE GLOBE NO. 2208 (OR EQUAL) CLEAR, GREEN OR RED
STANDARD 10-OR 15 W. LAMP
1" BOUNDARY LIGHT FITTING (LOVELL NO AD2382-1 OR EQUAL)
DRAIN HOLES
NO 14 DUPLEX LEAD COVERED CABLE. LEAD SHEATHING CUT BACK AND CONDUIT FILLED WITH SEALING COMPOUND. (OZITE OR EQUAL)
1" GALV CONDUIT 2'-3" LONG
UNLESS OTHERWISE SPECIFIED
3 FT. DIAMETER
2' MINIMUM
1"x1"x1" GALV CONDUIT "Y"
3" MINIMUM
1" GALV CHASE NIPPLE
APPROX
LEAVE SLACK IN CABLE
STANDARD UNDERGROUND CABLE CO'S THREE WAY JOINT BOX (OR EQUAL) TO BE FILLED WITH OZITE OR EQUAL SEALING COMPOUND
1" GALV. CONDUIT, 2' LONG

Fig. 5—Details of boundary light showing method of installation

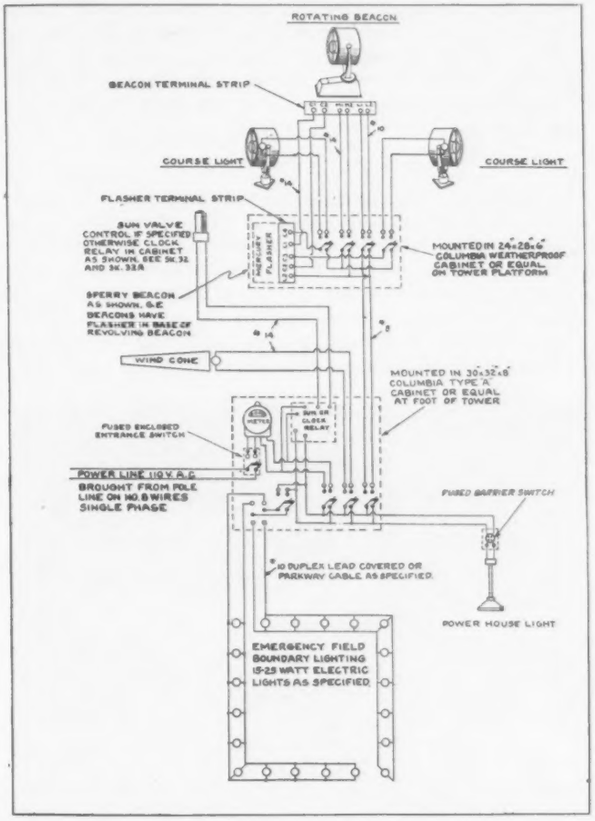

ROTATING BEACON
BEACON TERMINAL STRIP
COURSE LIGHT
COURSE LIGHT
FLASHER TERMINAL STRIP
SUN VALVE CONTROL IF SPECIFIED OTHERWISE CLOCK RELAY IN CABINET AS SHOWN. SEE SK. 32 AND SK. 33A
MOUNTED IN 24x28x6" COLUMBIA WEATHERPROOF CABINET OR EQUAL ON TOWER PLATFORM
SPERRY BEACON AS SHOWN. G.E BEACONS HAVE FLASHER IN BASE OF REVOLVING BEACON
WIND CONE
MOUNTED IN 30x32x8" COLUMBIA TYPE A CABINET OR EQUAL AT FOOT OF TOWER
FUSED ENCLOSED ENTRANCE SWITCH
POWER LINE 110 V. A.C. BROUGHT FROM POLE LINE ON NO. 8 WIRES SINGLE PHASE
FUSED BARRIER SWITCH
10 DUPLEX LEAD COVERED OR PARKWAY CABLE AS SPECIFIED.
POWER HOUSE LIGHT
EMERGENCY FIELD BOUNDARY LIGHTING 15-25 WATT ELECTRIC LIGHTS AS SPECIFIED

Fig. 6—Wiring diagram for "D" type beacon.

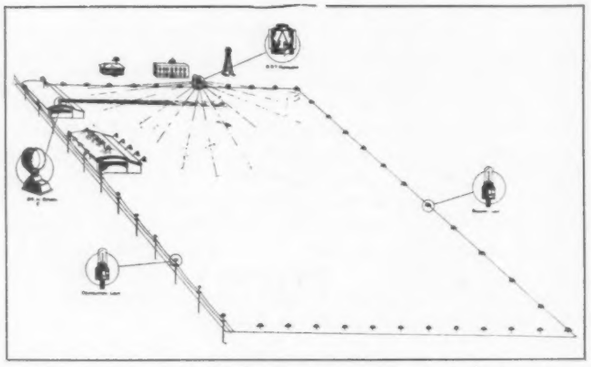


Fig. 7—Layout of lighting equipment at a typical airport.

marked by lights to inform the pilot of the shape of the field.

3. The best approaches to the field must be indicated by green lights.

4. All obstructions within gliding distance of the field must be indicated by red lights or by floodlighting.

5. To give the pilot the proper perspective and to enable him to gage his height above ground and the distance from the field, the hangars and other buildings should be floodlighted, not only on the roof but on the side walls.

6. An illuminated wind cone or other device to indicate the direction of the wind must be provided.

7. Sufficient light must be thrown upon the ground to assure a perfectly safe landing.

8. Flood lights to illuminate the taxi area immediately in front of the hangars when the field floodlight is off are recommended.

9. A searchlight to indicate the ceiling on a foggy or cloudy night also is recommended.

The previous discussion regarding beacons and boundary lights for emergency landing fields applies also to airports, with the single exception that beacons may be located on the roof of the airport office or on one of the hangars instead of on a specially constructed steel tower.

Floodlighting the Field

For floodlighting the field for landing, a B.B.T. floodlight, a Sperry landing light, a twin floodlight, or a series of special projectors developed particularly for airports may be used. It is desirable to employ a source of light the beam of which will illuminate an area approximately three-quarters of a mile in radius at an intensity that will permit safe landing. Such lights, in order to prevent undesirable glare, must have a beam confined to a limit of about two degrees above and two degrees below the horizontal.

Fig. 8—Night view of an airport showing intensity of illumination.

The light source employed with a B.B.T. floodlight is a 150-amp., semi-automatic arc system. The Sperry light uses a 55-amp., full-automatic arc system. A 10-kw. incandescent lamp may be used with the B.B.T. light. The arc lamp produces a more intense illumination and a more uniform divergence of the light beam than the incandescent lamp. These factors, combined with the smaller light source of the arc, considerably reduce glare. The special twin floodlights that have been developed for airport lighting permit a beam divergence of 80 deg. in the horizontal plane, with the vertical spread limited to 6 deg. The light source consists of two 5-kw. or two 10-kw. incandescent lamps depending upon the intensity of illumination required.

A system of floodlighting a field using a series of multiple, specially designed airport projectors also has been developed. With this system four or more projectors are mounted on 300 or 350-ft. centers along one edge of the field. Each projector is equipped with a 1,500-watt projection lamp and develops a beam candle power of 280,000 with a 45-deg. spread lens. This multiple arrangement insures continuity of service, for obviously if one light fails the other units will give sufficient light to insure a safe landing. It has the further advantage of permitting the lighting of a rolling or uneven field as each light may be adjusted individually. A parabolic metal reflector and louvers on the front of the light limit the divergence of the beam to 1½ deg. above the horizontal.

It has been found most advantageous to mount the field floodlight from 5 to 8 ft. above the ground surface adjacent to a small house in which the motor-generator set can be installed in case arc or Sperry lights requiring direct current are used. Lights are mounted at one side or in one corner of the field. In particularly large fields two floodlights mounted in opposite corners are used. This practice has the added advantage of permitting the use of one light, depending upon the direction of the wind, so that the landing aviator will not be subjected to glare.

For a ceiling light a 12-in. or 18-in. spot-mounting incandescent searchlight is satisfactory. It is mounted in a fixed position on the hangar or administration building. By fixing the projector at an angle of 45 deg. the height of the clouds or ceiling may be obtained by measuring the distance from the light to a point directly under the spot of light the beam makes on the clouds. Fig. 7 shows the layout of a typical airport, while Fig. 8 shows a night view of the field. For floodlighting the taxi area a 500-watt lamp in a wide-beam projector may be mounted on top of the hangar.

For floodlighting hangars, administration buildings and other structures on the field, standard floodlighting equipment such as has been developed by a number of manufacturers may be used.

Control of all of the airport lights should be centered in one place, preferably in the office of the field manager in the administration building. All of the equipment that has been developed for airport lighting lends itself admirably to remote push-button control.

The importance of the airport load to the central station can be shown by figures from one or two of the airports that have been placed in operation on the Pacific Coast. The estimated load of the Oakland Airport on Bay Farm Island is 50 kw. for lighting, 40 kw. for air heating and 150 hp. for power. The estimated annual revenue from this field is $10,000. Mills Feld, the San Francisco airport, has a connected load of 50 kw. Both of these installations will be described in a future issue of Electrical West.

New Street Lighting Developments

As Shown by Installations in Several California Cities

THAT the slogan of the street and highway lighting committee of the N.E.L.A., "Merchandise Street Lighting," is more than a mere statement of words, at least in so far as several California communities are concerned, is proved by recently completed street lighting installations in San Francisco, Los Angeles, San Diego, Oakland, Berkeley and Santa Barbara. In practically every one of these cities extensive lighting programs are under way and the installations reviewed in this article are but the first of a series of comprehensive plans involving hundreds of miles of business streets and main traffic arteries.

GREATER public appreciation of street lighting is shown by the large number of noteworthy systems installed during the past year in cities in California. In this article some of the installations involving new technique or novel practices are described.

A most extensive program has been adopted by the City of Oakland that involves for the present the lighting of the downtown area and that will be extended into the residential districts in the future. A standard design involving a family of three different sizes of standards has been adopted by the city and an ordinance prohibits the use of any but the standard design. The ordinance does not apply to the fixture units and the method of bidding employed permits competitive tenders on standards alone as well as on the entire job, including installation.

The total street footage involved in the installation just completed is 17,514 ft., and although over 30,000 front feet of property was involved there was not a single protest when petitions were circulated among the property owners. The entire cost of the system was assessed against the property and in addition the property owners pay a part of the cost of maintenance and operation of the system. Maintenance work on the system is carried on by the power company on a contract basis.

The installation comprises 353 two-light standards on 6.6-amp. series circuits. The standards are 20 ft. in height to the light center, are of sectional cast iron construction internally reinforced with a vertical 4-in. wrought steel pipe, the lower end of which is embedded in the concrete foundation upon which the standard rests. The standards are spaced 100 ft. apart and opposite.

Each standard is equipped with two Novalux lighting units with medium alabaster rippled glass globes and canopies of the same glass. Two 15,000-lumen, 20-amp. series street lamps are used with energy supplied from two IL series transformers in the base of the standard. No refractors are used, it having been decided that they were unsuitable in business district lighting of this intensity. Each circuit is loaded so far as practicable with 30 kw. The circuits are so arranged and controlled that three-fourths of the lamps may be cut out at midnight leaving one lamp on the curb side of every alternate standard burning the latter half of the night.

The connections between the secondary terminals of the series transformers and the lamp sockets are unique. No. 8 solid copper wire was used in preference to the commonly used stranded wire in order to avoid seepage of water down through the interstices of the stranded wire into the windings of the transformers. Connection to the secondary is made through an angle fitting screwed onto the nipple and filled with insulating compound, a drip loop being provided in the wire outside the fitting.

The conduit in which the cable circuits are installed is 1½-in. standard weight black wrought steel pipe instead of galvanized or sherardized interior conduit such as is common practice in Pacific Coast cities. The conduit ends in the base of each standard are fitted with bushings with grounding lugs on the side. The cable sheaths are bonded and grounded at suitable intervals and each standard is grounded to the conduit.

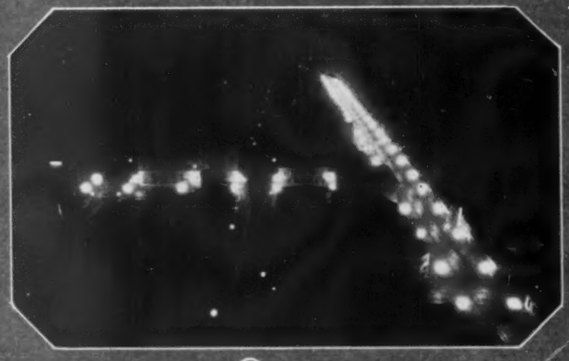
The cost to the property owners for the installation was $4.63 per front foot including such incidental expenses as engineering, inspection and publication of notices. This is an unusually low cost and Oakland officials are doubtful if it can be duplicated in future jobs. It is the ambition of the city officials to make Oakland the best lighted city on the Pacific Coast. At the present time plans are under way for the installation of 700 more standards similar to those in the system just completed. The installation was put in by A. C. Rice, Los Angeles contractor, under the direction of Carl Hardy, superintendent of the Oakland electrical department.

In Berkeley a new street lighting system has been completed on University Ave. from the campus of the University of California to San Pablo Ave. and on Shattuck Ave. from University Ave. to Dwight Way. On the Shattuck Ave. system Union Metal pressed steel standards are used and on University Ave. King cast-iron standards were installed. The light center is mounted 20 ft. 9 in. from the sidewalk, which is slightly higher than usual practice. The standards are spaced 100 ft. apart and opposite. A two-light standard is used with a special reinforcing consisting of a section of 4-in. wrought iron pipe inside for reinforcing. In case one of the standards is broken the pipe will support the heavy top casting with the two lighting units.

Two 6,000-lumen, 20-amp. lights are used with two 6.6/20-amp. type IL series transformers in the base of each standard. The control of the circuits is so arranged that the sidewalk side lamps are turned off at midnight leaving the street side lamps to burn all night. The transformers have sufficient capacity to operate 600, 1,000 or 1,500-cp. lamps so that intensities may be stepped up at any future date without changing connections.

An unusual feature of the installation is the application of two different types of refractors to the two units on each standard. Units on the sidewalk side are equipped with a symmetrical dome refractor; the street side unit employs an asymmetric dome refractor. Thus sufficient light is cast on both sidewalk and street and no light is wasted. Because the asymmetric refractor distributes the major portion of the light on the street, plenty of intensity is provided for street traffic after

MORE notable among the street lighting installations in the San Francisco Bay cities are (1) and (2) Berkeley, Shattuck Ave. day and night scenes. (3) The distinctive Chinese lantern in San Francisco's famous Chinatown. (4) Oakland, showing the old and new lighting, as seen from the Tribune tower. (5) Intersection of Broadway and Telegraph Sts., Oakland, with old and new standards shown in comparison. (6) The Oakland standard, which will be used in all future installations in that city.



Street Lighting Progress

STREET lighting in southern California has been developed to an unusual degree. Some of the more recent and outstanding installations are illustrated here. (1) A typical residential district standard of concrete with two-light top. (2) Wilshire Blvd., Beverley Hills, a job of extra quality and good illumination. (3) The Wilshire post, of bronze on a terrazzo base. Blue gum trees planted between standards may also be seen. (4) Broadway, San Diego, lighted by five ball clusters two years ago, and (5) the same thoroughfare today with its white way lighting. Buildings, plaza, and every detail on the street are now plainly visible at considerable distance. The replacing of old lighting standards with modern and efficient equipment in San Diego has effected changes in the entire city's lighting, both commercial and domestic.

midnight when only one unit is burning. The installation in Berkeley was under the supervision of Frank B. Rae, city electrical engineer.

Lighting San Francisco's Chinatown

A most unusual street lighting installation has been completed in San Francisco's Chinatown during the past year. In this system a special design was worked out by J. W. Gosling of the General Electric illuminating laboratory at the request of the Downtown Association and the Chinese Chamber of Commerce. The Chinese motif is followed throughout. A cast-iron standard representing a section of bamboo supports two dragons upon which the lamp is mounted. The lighting unit is cast aluminum designed to represent a Chinese lantern. The canopy is of copper. The base of the standard is red and gold, the post pale green, the dragon gold and the lantern red lacquer with gold detail.

The light source consists of a 15,000-lumen, 20-amp. lamp fed from a 6.6-amp. series circuit through a type IL transformer. The transformers are placed in manholes in the street instead of in the base of the standard. The light source is mounted 18 ft. above the street. No refractors are used, amber art glass having been substituted. The lights are spaced four to a block and are staggered.

The installation is thoroughly up to date from an illumination standpoint and the system is an example of street lighting designed to fit the particular atmosphere of the district to be lighted.

Notable Los Angeles Installations

A view of Los Angeles and surrounding communities from Mount Wilson discloses a panorama of street illumination not to be matched perhaps in any part of the world. While it cannot be said that the lighting has been planned with any definite unity of design, each district having been approached separately and its installation made without particular reference to other adjacent systems, it is true, nevertheless, that a generally satisfactory condition prevails as respects both street illumination and design of standards.

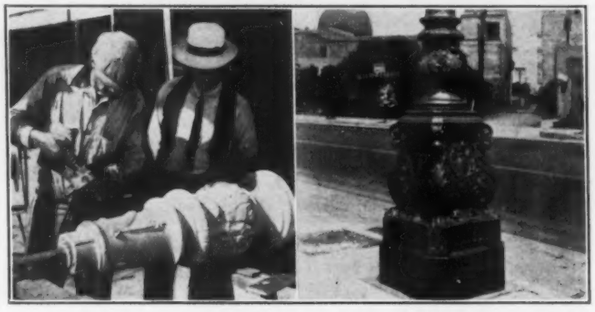
It has been estimated by Mr. Wilkins of the Newbery Electric Corporation, Los Angeles, which has installed a number of large jobs during the past few years, that there are more than 2,000,000 street lighting standards in Los Angeles County at the present time and that an average of 2,000 to 3,000 posts are being installed annually.

It is a common experience to find entire tracts over which complete street lighting installations have been made. And while there are some street lighting standards where to a casual observer there can seem to be no logical excuse for them, due to the sales efforts of energetic realtors, yet more of the well established residential tracts are taking to street lighting as a civic responsibility. A case in point is a recent installation made by the Newbery organization in a highly improved tract off Long Beach Blvd., where 723 posts were installed covering 300 blocks.

Perhaps the largest single installation in point of cost is the 500-post installation now being made on Wilshire Blvd. from Westlake Park to the city limits. It is estimated that each standard complete, exclusive of the conduit to serve it, will cost over $1,000, the entire job costing over $500,000, not including conduit. The standards are King cast iron coated with copper sprayed over a hot galvanized dip. The lantern, which is rectangular in shape, is 7½ ft. high itself. It contains two lamps, a 2,500 and a 600-cp. lamp, the first of which is to burn to midnight, the other to be turned on after midnight. No refractors are used, the sides of the lantern being made of ripple glass. The design is one made by the General Electric Company and is similar to the San Francisco Chinatown lantern in general proportions. A feature of the lantern, which places the light center about 21½ ft. from the street, is that ports at the base allow enough light through to illuminate the post itself and, at street intersections, the street name signs clamped to the shaft. This installation is being made by the Paulson Construction Company.

Beverly Hills-Wilshire Boulevard

The installation which may be termed the most luxurious, though not the most costly by any means, is the recently completed 243-post installation on Wilshire Blvd. through the city of Beverly Hills. The complete job, with its consideration of all details, both from an artistic and civic as well as mechanical standpoint, has earned it the praise of street lighting men and civic leaders who have seen it. The beauty of the standard, of its finish, and of the effect of the lighting and the co-ordination with the tree planting plans of the community, mark it as a special case.



Method of spraying moulten bronze by means of torch, as used on the Wilshire Blvd., Beverley Hills standards.

The post was designed by George W. Reynolds, decorator and designer, and is an adaption of a lamp in Venice, Italy. The standards were manufactured by H. H. Walker, Electragist, through his Lalux Manufacturing Company subsidiary. The post is cast iron, hot galvanized dipped and sprayed with moulten bronze by means of a patented oxy-acetylene blowtorch. The base receives extra decorative treatment by means of four massive solid bronze corner ornaments and a plate which gives access to the base of the pole. The shaft is a plain, undecorated one, surmounted by a cap which supports the 4½-ft. lantern, also of solid bronze. The standard is mounted on a 1-ft. terrazzo base, which is the top of a 4-ft. concrete foundation, bringing the light center 21½ ft. above the street. The posts have been treated to age the bronze.

These standards are placed 115 ft. apart approximately opposite each other. The electrical equipment consists of a G. & W. disconnecting pothead in the base of the post and a 2-tap, 6.6-amp. Lelux transformer, capable of serving either a 1,000 or a 1,500-c.p. lamp. A Westinghouse bi-lux refractor is used for distribution of the light. The circuits are so planned that alternate lights may be turned off at midnight.

The Beverly Hills installation, despite its unusual features, was installed at a cost to property owners of approximately $6 per front foot.

Another interesting feature of the Beverly Hills installation is that J. C. Elders, city engineer, with the aid of Clark Baker, National Lamp Works, Oakland,

and others interested, made a search through local nurseries for a tree which would not interfere with the lighting and yet serve to decorate the streets. A blue gum was chosen finally because it was found that for three years its foliage would not be high enough to interfere with the lighting; for three years the tree would be of a height to interfere slightly, and then would be high enough in foliage from then on not to interfere with the light on the street and yet serve to break the effect of long lines of light on each side of the boulevard.

San Diego Revamps Its Street Lighting

Awakened to the new possibilities of street illumination by a test case made on E St. in 1924, which G. H. P. Dellman, lighting sales engineer for the San Diego Consolidated Gas & Electric Company, and this year chairman of the P.C.E.A. lighting bureau, provoked, the city of San Diego has followed a consistent and growing relighting program ever since. The result is an unusually comprehensive downtown street-lighting area and the lighting of several outlying business district streets with up-to-date illumination.

The downtown section, with the exception of one main street, has been changed over completely from single, two, three or five-ball ornate but inefficient lighting unit systems, to high efficiency, high mounting-height, refractor-equipped and high-lumen-output units. The force of example was used chiefly in selling downtown property owners on the value of the newer types of lighting equipment.

In the last four years there has been installed two miles of white way lighting, six miles of two-light business street lighting with 300 lumens per linear foot, and eighteen miles of single standards in semi-business districts with 150 lumens per linear foot. Besides this, about 12 miles of outlying business district lighting has been installed with 70 lumens per linear foot.

In all more than 2,000 standards have been installed in new subdivisions. These average about 125 ft. spacing, staggered, with 4,000 lumens per standard.

During this period 193 cluster posts of old styles were replaced with modern lighting.

Improved Technique

It is only natural that experience in making installations should bring forth some interesting sidelights on the installation of street lighting, as well as developments in the technique of placing units on already improved streets.

To minimize the necessity for tearing up pavements, a practice looked upon with disfavor by the public, the installation of conduit has been accomplished by driving lengths of conduit through the ground from pits excavated at intervals at the curb line. At first a pointed cap was screwed to one end of the conduit and the other end forced by means of jacks. It has been found that points, however, are not as satisfactory as the ordinary blunt pipe cap, since the point, upon striking an obstacle, has a tendency to veer to one side, whereas a blunt point will force the obstacle to one side and itself stick to its course.

Due to the increasing number of utilities using underground services the employment of parkway cable is giving way to more use of conduit. The danger of running into a live parkway cable is thus eliminated. Oakland's use of solid copper rather than stranded wire, to avoid the effects of seepage into the transformers, is another interesting development.

There are other large and interesting street lighting installations of which space will not permit mention. In fact proper street lighting is becoming the rule rather than the exception and it is only to the unique features of each new installation that attention must be turned in the future, the fact of a new and larger installation itself becoming a daily experience.

Cost Data for Complete Electrical Hospital Installation

ONE reason why the electrical industry has not made more progress in the work of selling the idea of electric cooking, water and air heating, has been a startling lack of real statistics covering actual installations under work-a-day conditions. The following letter, written by the superintendent of the Kern County Tuberculosis Hospital, known as Stonybrook Retreat, in the Tehachapi Mountains on the Southern California Edison Company lines, is particularly illuminating. The connected load at the time this letter was written was 100 kw. The consumption and revenue for the first nine months in which the equipment was installed were as follows:

	Kw-hr.	Revenue
May 26 to July 30, 1926	2,240	$ 49.56
July 30 to Aug. 30, 1926	2,960	61.58
Aug. 30 to Sept. 29, 1926	4,880	99.10
Sept. 29 to Oct. 29, 1926	11,120	223.90
Oct. 29 to Nov. 30, 1926	15,760	316.70
Nov. 30, to Dec. 30, 1926	22,560	452.70
Dec. 30, 1926, to Jan. 31, 1927	20,320	407.90
Jan. 31 to Feb. 28, 1927	19,840	398.30
Feb. 28 to March 29, 1927	22,640	454.30

This institution is located about 3,000 ft. above sea-level, and during approximately six months of the year is subject to rather low temperature, requiring a lot of heating.

Extracts from the letter follow:

We have been using electricity for heat, cooking, heating of water, and light and power for the past year. I can give you the figures in terms of kilowatts or in any other way that you may desire, but, possibly if I tell you the cost of doing this it will mean more to the average layman than if I should give you the number of kilowatts used and then submit you to the labor of calculating the cost.

I have put wattmeters on the various features of equipment and therefore have rather accurate figures in regard to the cost of operating each appliance.

Our electric range, oven and griddle used for doing all the cooking for the institution—50 patients and 25 employees—averages $2 per day.

Air heating, which means heating the dressing rooms, bath rooms, examination and X-ray rooms, dining rooms and the employees' living quarters, averages for the six months from November to May, $5.98 per day.

I found it was not economical to heat large bodies of water by electricity. The most economical installation is at the nurses' home, a 30-gal. hot water range boiler connected to a 3-kw. Hotpoint automatic electric water heater. The cost of operating this unit is 30 cents a day during the winter months.

The nurses' home, superintendent's cottage, night nurses' cottage, cottage for women help, cottage for men help, and in fact all the outlying buildings, are equipped with either a 3-kw. automatic water heater and a 30-gal. tank or, as in the children's building where there are twelve people using the water, we have a 66-gal. tank and a 3-kw. water heater which gives ample hot water for all purposes. We tried a 100-gal. range boiler with a 5-kw. automatic electric water heater in the kitchen and also one in the infirmary. In the kitchen it was successful; it supplied plenty of water, but it cost as much for hot water as it did to do the cooking. In the infirmary, where a great real of hot water is used, it averaged $2.40 a day. This I concluded was too expensive, and therefore for supplying large amounts of hot water I found that a 1,000-gal. tank with a Universal distillate burner is much more economical as an abundance of hot water can be supplied at an average cost of $45 per month for labor, upkeep, distillate and everything pertaining to the heater. Therefore, for your outlying buildings I suggest that you use water heaters and 30 to 66-gal. hot water range boilers. For the kitchen and hospital building, if gas is not available, use a Universal distillate burner in conjunction with an 800 to 1,000-gal. storage tank.

We find that we can cook and heat by electricity for about the same amount that it cost us when using wood and coal, but we lack the inconvenience and the dirt connected with the use of wood and coal and have, on the whole, a much more satisfactory service.

Some highway lighting recently installed. Left: the Berkeley vehicle ferry pier at night. Center: a highway lighting unit on a poletop extension, near Atascadero. Right: the same highway at night.

Attention Turns to Highway Lighting

Installations Already Made Serve as Guides to Projects for More Extensive Highway Lighting Programs Soon to Begin

WITH highway lighting the situation is the reverse of that concerning street lighting. Whereas street lighting has now become almost commonplace, as installations are being made in all parts of the West, the highway installation is still unique enough to warrant special attention and more than passing notice.

The first highway installation of any consequence in California was made a little more than a year ago on what is known as the Whitley-Shandon extension, a few miles out of Paso Robles, Calif. It covers approximately twelve miles. The units are placed 400 ft. apart and mounted at a height of 35 ft. A 400-cp., 6.6-amp. series lamp is used.

The particular unit selected, namely the bracket type series highway lighting unit, known as the nested parabolic type, was chosen after a number of tests made by the San Joaquin Light & Power Corporation at its River Bend plant. It is of General Electric manufacture and delivers 9,000-beam cp. in both directions.

With this installation as with a newer one recently put in at Atascadero, Calif., over a distance of about four miles using the same equipment, approximate spacing and mounting height, the only criticism has been that due to the character of the topography glare has not been altogether eliminated. In rolling country such as that found where the foregoing installations have been made the problem of glare has not yet been solved satisfactorily.

Other highway lighting installations have been tried in Marin county and in a numer of isolated cases where the approaches to a railroad crossing have been lighted by a few units. The approaches to Dumbarton Bridge, across lower San Francisco Bay, have also been lighted with highway units. In the instance of Marin county, because of the trees lining the highway and the necessity for mounting the units lower than is recommended, the results have not been all that could be desired.

An instance of successful highway illumination even with the unit mounted lower than recommended mounting height is that of the Golden Gate ferry pier in Berkeley. This installation was made by the Great Western Power Company recently on the 3½-mile pier that stretches more than half way across San Francisco Bay to serve a vehicular ferry system. The long pier is lighted by 75 Novalux highway units (nested parabolic reflector type). Lamps used are of 2,500-lumen output, spaced 256 ft. apart. The mounting height is only 26 ft., although the ideal mounting height is 35 ft.

In this case glare is minimized because of the level roadway and the absence of curves, also because the spacing is slightly closer than usual. The close spacing and specular reflection on the black bitumen road surface provides a bright background for the bright light sources thereby reducing the contrast and thus minimizing the glare which would be apparent at a 26-ft. mounting height under less favorable conditions.

This installation may well be regarded in a laboratory sense, since it provides almost ideal conditions for the study of highway lighting. It has been found that the glare from approaching headlights is practically eliminated and an even distribution of light provides perfect visibility for safe driving under all conditions of traffic.

That highway lighting is only beginning to receive attention and that further installations soon will make it a common occurrence is borne out by the announcement made recently that the first section of the Ventura Boulevard from Los Angeles to Ventura is to be lighted by means of highway lighting units soon after the first of the year. The first section is to be eight miles in length, which will be increased section by section until the highway between the two cities is completely illuminated for night travel. The latest highway lighting equipment is to be tried out for this particular job.

It has been felt for many years that the real solution to the automobile headlight problem can be found only in more adequate illumination of the highways *per se*. Studies are being made by the lighting bureau of the Pacific Coast Electrical Association looking toward a complete survey of the possibilities for highway illumination in the state at least adjacent to power lines of the serving companies.

More Light on the Present Electric Water Heater Situation

By S. B. Hood
Research and Development Engineer, Oakland, Calif.

DURING the past year and one-half it has been the writer's pleasure to carry on a somewhat intensive research study of the water heater situation and its possibilities as a load builder for the electric utility.

The article by H. K. Griffin in the October 1 issue of ELECTRICAL WEST received most careful study by the writer as it gave operating data on a type of water heater which investigations indicated would lead the utility into an undesirable situation should the use of the high-demand, uncontrolled-peak form of heater ever find usage approximating the saturation point.

In selling the public new forms of utilization equipment it is very easy to take the line of least resistance and "to sell our shirt" as long as there are plenty more of them at the source of supply.

In introducing electric water heater service we have perhaps the only practicable form of utilization which permits of thermal storage. If the utility fails to take advantage of this means of developing better load-factor business it is letting pass the opportunity of a lifetime. Once the low-first-cost, high-demand intermittent-service type of heater has become popular it is going to be almost impossible to change to the low-demand, thermal-storage type.

The research work previously mentioned brought out most conclusively that it is practicable to render a 100 per cent satisfactory domestic water heater service without any appreciable increase in system peak demand.

Boiled down to its final conclusions the answer was found to be in the use of an immersion type of unit of from 750 to 1,000-watts capacity, controlled by a thermostat and also by a suitable series relay through which passed both range and lighting energy. With this type of control and installed demand there was no appreciable increase in distribution system integrated peak.

The thermal storage tank must have a capacity equal to the daily average demand, or between 40 and 60 gal., and must be thoroughly heat-insulated with not less than 3 in. of hair felt or other equally good insulation. It is also essential that the cold water supply be controlled by some form of baffle plate to prevent too rapid mixing of the hot and cold water.

With such an installation the energy consumption will average approximately 250 watts per gal. of water and from 300 to 350 kw.-hr. per month. Such a system means ample supply of hot water at all times without the need of foresight on the part of the consumer in anticipating his requirements.

The article by Millard Sebern in the December 1 issue of ELECTRICAL WEST brings out the desirability of the low-demand type heater as compared to the high-demand type described in Mr. Griffin's article. It, however, does not go far enough, and further, does the thermal-storage, low-demand type an injustice since it fails to bring out the unquestionable fact that from the consumer's standpoint the thermal storage type is far preferable.

In order to get just a little different slant to this question of costs let us assume the investment figure of $300 per kw. On this take the demand element of the necessary rate at 12 per cent per annum giving an easily applied figure of $3 per month per kw. of integrated demand. Again assume an energy cost of 1 cent per kw.-hr. to be added to this direct demand charge.

Now we have something we can build on. The high-demand heater requires 1.7 kw. and 197 kw.-hr. At this arbitrary rate such a heater would justify a monthly charge of $7.07 or 3.6 cents per kw.-hr. although the "value of service" places a limitation of 2 cents on the rate for water heating and it is not any too easy to sell the consumer even at that rate.

Now take the form of heater which research leads me to believe is the ultimate solution. This has an installed demand of 750 watts and a monthly consumption of 300 kw.-hr., giving for this *real* water heating service. On the same theoretical rate used above, the monthly bill should be, neglecting peak load control, $5.25 per month or 1.7 cents per kw.-hr. Here we have a rate better than the 2-cent limitation but a monthly bill in excess of what most consumers would consider the value of service.

By introducing the range and light off-peak control the demand element is eliminated and practically all the energy consumption comes during the night hours and completely off both system and local peaks.

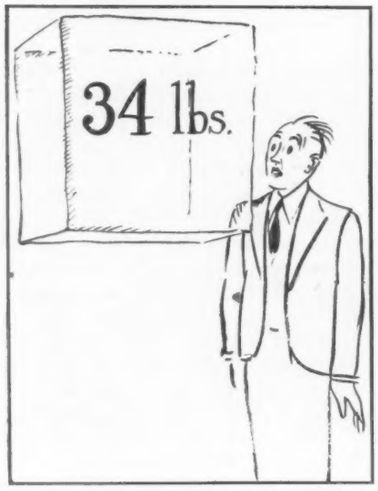
Under the assumed rate, therefore, the only charge would be that of the 1 cent per kw.-hr. or $3 per month which is substantially less than the 2-cent rate high-demand return of $3.78 and in addition the consumer is receiving real service.

From the standpoint of the utility, comparison should be made between the high-demand installation mentioned in Mr. Sebern's article, showing a return of 20.6 per cent on the investment necessary for lights, range, appliances and water heater, and for the same service with the low demand, controlled-peak heater. The latter installation would require, based on actual system tests, a 1.25-kw. demand or an investment of $375. Using $5 as the ordinary revenue, plus $3 for the controlled thermal-storage heater we have $8 per month, or $96 per annum. This is about 26 per cent return on the investment and earned on a class of service that is ideal from the consumer's standpoint and one which the utility can push to the saturation point. The difference between the two types of service is entirely one of load factor.

The high-demand heater plus the range gives a demand of 1.7 kw. Of this assume 1 kw. as the integrated range demand, leaving 0.7 kw. for the water heater with its wide diversity, giving a load factor for the water heaters alone of 40 per cent based on the integrated system demand. Taking the combined load of 1.7-kw. demand and allowing 200 kw.-hr. for range, lights, and appliances, the customer's load factor, integrated on the system, is about 31 per cent.

Now taking the low-demand, controlled-peak installation, we have a system integrated demand of 1.25 kw. with a monthly consumption of 500 kw-.hr., giving a load factor of 55 per cent. In the latter case the water heater operates on a load factor of 55 per cent based on its installed demand.

It should be given full consideration that a typical residence installation, with a demand of 1.25 kw., a monthly consumption of 200 kw.-hr., and a load factor of but 22 per cent, can be increased to 500 kw.-hr. per month and a load factor of 55 per cent without adding to the system integrated peak. In addition the customer need install no heavy wiring for the low-demand heater which is served by a peak-controlled branch of the existing wiring. This saving in wiring expense alone largely offsets the slightly higher cost of a low-demand, thermal-storage type of heater.



An adult in good health consumes about 34 lb. of air in 24 hours and retains about 7 lb. of oxygen.

Electric Ventilation ---

By Andrew G. Orear,* Manager Pacific Coast District,

When lighting is thought of it is taken for granted that it is electrical. There is as much reason to think of ventilation as electrical also.

SINCE man left the trees and open spaces, seeking his abode in caves and man-made shelter, he has had the problem of ventilation. Nature protected ancient man in his problem of ventilation in the fact that his fire produced changing temperatures of the air around him and created a circulation of air, or a type of ventilation.

As civilization progressed and living conditions crowded people together, man was compelled to resort to better ventilation. Our forefathers constructed large fireplaces in their homes and the structures were not as closely built as they are today. They burned tremendous quantities of cheap fuel and secured a very positive form of ventilation with the fireplace.

Public buildings, perhaps, first received engineering consideration as respects mechanical ventilation. The mechanics of the early days were such that ventilating systems were operated by steam engines. These systems, obviously, were very expensive and the necessary engineering considerations somewhat extensive.

The Electrical Era in Ventilation

Electricity solved an economic problem in the ventilation field. The development of electric motors permitted the ventilation manufacturer to give consideration to small or more standardized types of equipment. With the direct current system slow-speed motors were not a serious problem. Alternating current, however, confronted the ventilation engineer with the problem of driving slow-speed machines with high-speed motors. Motor manufacturers were able, with increased experience, to produce economical slow-speed alternating current equipment, making it possible to direct-connect moderate sizes of ventilation machinery, eliminating the incident waste of space and increasing the efficiency of machinery. Electric power undoubtedly has revolutionized the ventilation industry.

We are told that ventilation is defined as the science of maintaining atmospheric conditions which are comfortable and healthful to the human body. Civilization today causes mankind to remain indoors for long periods of time and only with adequate ventilation can he retain health.

Medical science has long since discovered the relationship between good ventilation and good health, and has urged that consideration be given to proper ventilation and conditioning of air in schools, auditoriums, and other places where people gather.

Ventilation and Human Efficiency

The factory owner has been forced to realize that adequate and proper ventilation has a direct bearing on the efficiency and health of his workmen. To him good ventilation is a matter of dollars and cents in the fact that full human vigor and full-time operation from the employees permit maximum production.

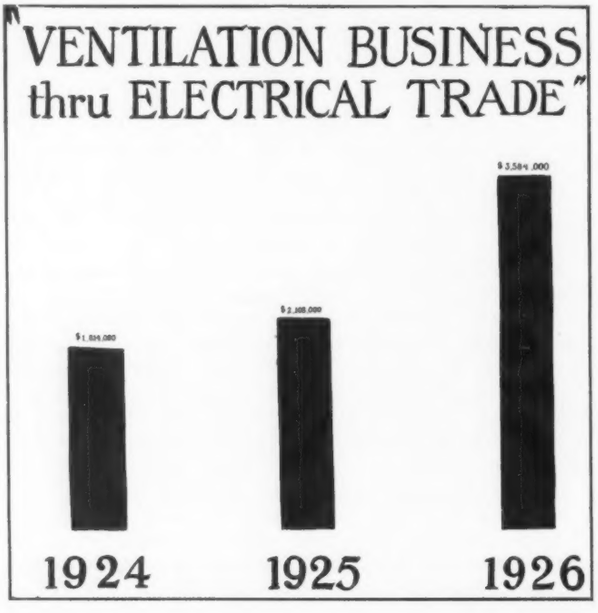
The office manager is forced to recognize that the "afternoon fag" slows up work in the middle and late afternoon, due to brain fatigue caused by improper ventilation. For full production it is a good investment to furnish proper air conditions for the employees.

Even the faithful cow will produce greater and better quantities of milk if kept under proper sanitary and adequately ventilated conditions. It has been found that 2/3 of the cow's ration is air. The dairyman of today is spending many thousands of dollars to ventilate cow barns.

The poultry producer finds ventilation an absolute necessity in the hatchery and the hen house. A greater percentage of hatch is secured and better and healthier chicks are produced under properly ventilated conditions in the hatchery. Proper ventilation in hen houses eliminates colds and diseased chickens.

Good Ventilation Is Good Business

The restaurant man of today cannot hold his trade with a poorly ventilated place of business. The better restaurants provide an adequate ventilating system, affording people confort and contentment while in their place of business. Poor ventilation kills appetite. Competition among restaurants forces a poorly ventilated



* From an address delivered at the annual state convention of the California Electragists, Riverside, Calif., Oct. 15, 1927.

a Market Worth Developing

Ilg Electric Ventilating Company

place to ventilate properly as a matter of holding its trade.

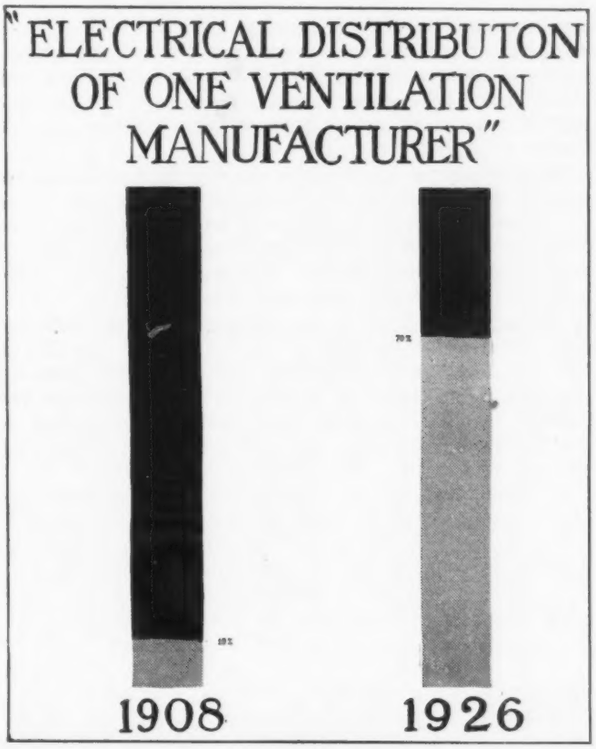
People will no more trade at a poorly ventilated store than at a poorly lighted one. Glaring light drives trade from a store; so does stagnant air.

The apartment owner who has provided proper kitchen ventilation secures tenants in competition with the man who does not recognize the benefits of proper ventilation.

The success of the modern theaters today is largely due to the fact that the theater owner has made his place of business one of comfort and pleasure. The theater goer sits several hours in an atmosphere of pure fresh air and soft diffused lights, and is surrounded by an atmosphere of comfort and contentment. The theater with poor ventilation has poor business.

Even the undertaking establishment finds it hard to get people into a small chapel if the atmosphere is heavy and depressing. Funerals are largely attended by older people who have great difficulty in breathing under normal conditions. The strong odor of flowers makes an unventilated chapel unbearable. As a matter of good business, the undertaker must provide proper chapel ventilation.

The modern housewife takes great pride in her housekeeping. The electric vacuum cleaner has simplified the problem of home cleaning. The modern washing machine and sanitary plumbing have made the home spotless. The home electric ventilator now removes every vestige of odor from cooking, and ventilates



The cave man found that his fire provided ventilation.

the house winter and summer. The modern housewife can entertain her friends with a freedom of mind, knowing that her guests will not realize the presence of cooking. The draperies and rugs will be free from cooking odors.

The church of today is compelled to compete for its attendance with the modern, well ventilated theater. The well attended church of today is a well ventilated church.

Even the lodge is compelled to ventilate properly in order to secure attendance at its meetings.

The public school is giving great thought to adequate ventilation as a safeguard to the health and mental efficiency of the children.

Electric Ventilation for the Contractor

Now to get down to the position of the electrical contractor and dealer in the ventilation business. It may be imagined that some elaborate system of air conditioning equipment, consisting of air washers, heating equipment and large blowers is necessary to ventilation, and that the motor is merely incidental in the picture. This kind of job is very intricate and will always remain in the hands of ventilation engineers and heating and ventilating contractors. It is the "round the corner" job near every contractor's place of business, a job that he can get and handle, to which the contractor should turn. There are literally thousands of such ventilation jobs in the average contractor's territory open sooner or later to him.

It was stated previously that ventilation equipment has been standarized. The most standard piece of equipment is the propeller-type ventilating fan. The electric motor and the wiring job is the big end of the propeller fan. A little sheet metal work is sometimes required incidentally, but it is largely the mechanical job of mounting the fan and connecting it up electrically. Even the engineering for propeller fans is standardized. Several manufacturers of ventilating equipment will give simple instructions for installing propeller types of fans for various purposes. Contractors will find engineers always willing to assist on more intricate jobs.

The Electrical Industry in Ventilating Business

In the May issue of the *Jobber's Salesman* it was stated that in 1926 the electrical jobbers in this country sold $3,584,000 worth of ventilating machinery. The sale in 1925 was $2,108,000, showing a growth of 70 per cent in one year. The records for 1924 show a sale of $1,814,000. For the three-pear period then, there was a growth of 97.5 per cent. With raido showing a growth last year of only 23.5 per cent and lamps 13 per cent in jobbers' sales, it would seem that the electrical industry is in the ventilation business up to its neck and going strong.

One large manufacturer of ventilating equipment reports that in 1908 10 per cent of the sales went to the electrical industry. In 1927 70 per cent of the business will go through the electrical channel. This is the best evidence of the possibilities for ventilation equipment sales by electrical contractors and dealers.

To get right down to a definite example, the following jobs were sold by one live-wire Los Angeles electrical contractor in a one-year period:

Music hall, one 36-in. fan.
Pottery, three 20-in. fans.
Clothing store, two 30-in. fans.
Factory, one 18-in. fan.
Factory, one 18-in. fan.
Factory, one 18-in. fan.
Residence, one 12-in. fan.
Office, one 12-in. fan.
Office, one 12-in. fan.
Photo engraving room, one 18-in. fan.
Photo engraving room, one 16-in. fan.
Newspaper, one 24-in. fan.
Blue print firm, one 24-in. fan.
Jewelry store, one 30-in and one 18-in. fan.
Lodge room, one 36-in. fan.
Restaurants, one 30-in. fan.
one 20-in. and one 16-in. fan.
one 24-in. fan.
one 36-in. fan.
one 17-in. fan.
one 18-in. fan.
one 36-in. fan.

These sales represent installations in 14 classes of business. There were seven restaurants. This record is several months old and an up-to-date count of this dealer's work will show that he is still keeping up the pace. This contractor deals largely with industrial and commercial customers and does not contract residence work. Ventilation is but a samll portion of his regular business.

Selling the Public Electric Ventilation

Several of the large ventilation equipment manufacturers are spending hundreds of thousands of dollars annually educating the public on the benefits of adequate ventilation. This advertising goes to the home owner and builder, the factory manager and the store owner, the office manager and the business executive. The dairy farmer is told the benefits which will accrue if his herds are kept in better ventilated barns. All of this advertising is selling electric ventilation.

The home owner has been sold the advantages of the convenience outlet and of adequate outlets for lighting purposes. You have sold the idea of eliminating glare in the home as a matter of comfort and health and the conservation of eyesight. The idea of the Red Seal Home has been put over in a big way.

The electrical contractor's competitors in home equipment have almost standardized the tile sink and better plumbing fixtures in the kitchen. They have made the built-in ironing board a regular fixture as well as other items of comfort. It is time now to sell the idea of electric ventilation in the home kitchen and bathroom.

A modern kitchen is the pride of the housewife. It is used more than any other room in the house, in the sense of actually "being used." The odors of cooking and frying have always been a problem as has the heat of the summer time. It is little wonder that the housewife loses her appetite for food ofter being absorbed in cooking odors and enduring the heat of cooking for hours.

The mistake of thinking that the residence kitchen does not need a rapid air movement for best results is often made. A 2-min. air change is absolutely essential for satisfaction. This requires at least a 12-in. exhaust fan in the smaller kitchens. The fan should, in every case, exhaust the air and not act as a supply fan in the kitchen. The latter would permit driving of kitchen odors to the other rooms of the house. The outside wall is the most satisfactory location for the kitchen fan, unless exhausting into prevailing winds.

This comfort can be had for the price of the moderately priced electric cleaner, or half the price of the washing machine, both devices undoubtedly already in the home. By explaining the small operating expense and little amount of care necessary to keep the equipment in operation, the quietness of operation, and the years it will last without service or replacement, it will be possible to sell the homeowner ventilation in the home and he will put it in his own office. This has often happened.

The store owner has been sold the necessity of using three watts per sq. ft. for lighting, as well as adequate window lighting, as a matter of good business. Now it remains to sell the same satisfied customer the advantage of removing stale air and replacing it with pure, clean, healthful air. His employees will do more work and be alert in their sales work all day long. The customer coming in from fresh outside air to the same quality of atmosphere inside will remain longer to shop and be in a better frame of mind for buying. Good ventilation is good business. The store owner should never be sold a job to give a 15-min. air change when he should likely have a 5-min. replacement of air.

Sell Adequate Equipment

Ventilation is an engineering science based on definite laws of performance and operation. It is futile to try to beat the game. We are told that a certain amount of air is necessary for various classes of requirements. These facts have been based on long experience. We are given certain ventilation machinery, designed to deliver definite volumes of air under set conditions.

The contractor is restricted by electrical codes to use certain sizes of wire to handle certain current values for definite lengths of run. He is restricted by good judgment to follow the suggestions of the engineers who know the ventilation science. These facts are available to everyone and easy to use.

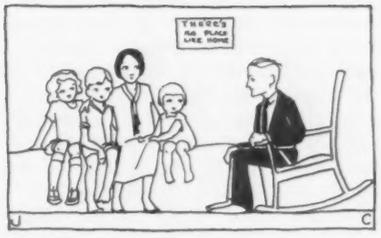
A little experience in the proper selection, location, and mounting of ventilating fans will prove this line to be well within the scope and ability of the electrical contractor and dealer to handle. The sales volume and incident profit will merit consideration. It is one of the few two-profit jobs; one profit on the fan and one on the installation.

In ventilation, a vent or duct without velocity and static pressure to push the air through it is useless. If the electrical industry will get the vision of the humanitarian considerations offered by ventilation to make people healthful, comfortable, and happy, and carry the message forward for electric ventilation, we will not be lacking the proper velocity and a lot of static pressure behind the message, and the Electragist will become a big and active vent in ventilation.

"Be It Ever So Humble"

— *and All That Sort of Thing*

By C. T. Hutchinson



IT IS a fact that the French language carries no word equivalent to the English word "home," and this is the point at which this erudite philologist stops attempting to analyze the term. Ignorant people who do not speak any of the Slavic dialects, who know little or nothing about Latin or Greek or their modern equivalents also are unable to tell just where the word "home" comes from. The Standard Dictionary enlightens us on this point not at all. We learn that "home is a noun," which is interesting enough as far as it goes, and that it is "one's fixed place of abode, the dwelling place of a person and his family, a family residence," also that "it is the place in which one was brought up." A second definition is better because home is described as "a place or abode of affection, peace and rest, a congenial abiding place." It is the latter definition that must have inspired that ancient melody that draws tears to the eyes of the absentee, or on the other hand, as the cynic has it, constitutes "a place to go when one has nowhere else to go."

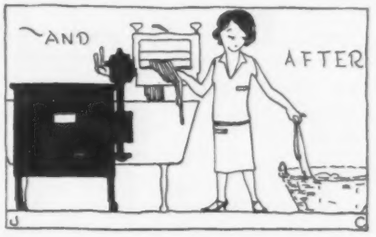
Even to risk being accused of harping too long upon one string, one may see in retrospect the log cabin of the Pilgrim Fathers, the Yule log burning on the hearth, the Christmas turkey giving forth the most enticing odors as it roasts before a slow fire, while mother is macerating the cranberries into that delectable combination known to this day as cranberry sauce. There are the children, not one, if you please, but many of them gathered around the festal board waiting for father to say grace before the first delicious slice of white meat succumbs to his skill as a carver.

And speaking of home, what seems to have become of the home? Only a hundred years or so ago a home was indeed a place of refuge. It was the headquarters of the family; it was the place where we spent our youth, where we went for shelter, comfort, sympathy and guidance and where after our adventuring in strange places we could always come back and be sure of a welcome. Mother did her own cooking, father provided the things to be cooked, mother wove the homespun out of which the children's clothes and the clothes of everybody else were made, and the children trudged off to the district school, and there was a family spirit of unity, co-operation and self-help that the perfervid orators of that day and for years afterward were fond of referring to as the foundation upon which our civilization was based.

Let us then turn over a few pages or so and ask, What has become of the home? Home is having a hard time to perpetuate its traditions. In fact these traditions, the very things that made the word home carry the significance that permitted the "Home, Sweet Home" idea, seem to be disintegrating under the modernity of the industrial, highly specialized manner of living that is in vogue today. Competition is severe. What chance does home stand in this age of jazz, the Eighteenth Amendment, the pocket flask, the delicatessen, the tin can and the baker, even though the baker advertises assiduously that his is home-made bread—save the mark!—and that the plum pudding that one buys in cans is of the kind that mother used to make?

Cooking in the home is fast becoming a lost art and is a luxury indulged in only by the well-to-do and the wealthy, and even in their cases the cooking is done by the hired help. Housewife is an obsolete term almost; there is of course the house and there is also the wife, but the two no more are hyphenated. What with the automobile, the moving pictures and the thousand and one distractions offered today to mother and children there is no particular reason why one should have to put in an appearance at one's home except possibly to sleep, and even then the hours of sleep are becoming less and less when exposed to the virus of the saxaphone, the automobile and the movies. Even the individual dwelling is fast giving up the ghost to the apartment house for the rich and the tenements for the poor. We have canned music, canned food and almost canned heat.

There is no particular use in wailing at the departure of what we are so fond of designating as the good old days, but is there not an idea worth saving in the traditions and sentiment that at least once did surround the word home? Is there not some way of applying modern science, modern industrial development and modern civilization toward the perpetuation of at least the sentimental idea of home rather than to permit these things to run wild and without direction toward their ultimate destruction? In thinking it all over and analyzing it from base to apex, there seems to be but one possible way by which the young people at least can be drawn to the home instead of driven away from it by the attractions offered by outside sources of pleasure and diversion. This one way lies in the power of the electrical industry to accomplish.



Much has been done in a number of instances without, however, having the benefit of a co-ordinated effort toward the perpetuation of the home itself as the major premise. Take the radio, for instance, plus improved broadcasting brought about particularly by the functioning of the Federal Radio Commission and also

by the National Broadcasting network by which the pleasure of really good entertainment and instruction may be brought into the home. This is a fruitful field for greater effort along the lighter side of home life that cannot help but produce more and more satisfactory results as the state of the art itself improves.

Home drudgery that used to characterize the life of the housewife is something to which no sane man would ever desire to return. If anyone who might perchance read these words had ever arisen in the cold frost of early morning and tried to start a rebellious fire with green or damp wood and make a poorly designed chimney draw satisfactorily he would acquire a new appreciation of the true significance of electric heat and of the many altogether efficient, satisfactory and delightful appliances that make of cooking more a pleasure than a punishment that is to be shunned.

The famous slogan, "You press the button, we do the rest," can be applied most aptly to the electric home in all of its dips, spurs and angles. The rebellious fire disappears; heat and temperature control take their place. There is a fire that can be adjusted instantly and that does not have to be watched, that behaves itself just as faithfully when the housewife is out of the kitchen for an hour or two or three as though as in the old days she had to stay right on the job to be sure that the roast did not burn. Anyone who had to do her daily dozen or more pushing the treadles of an old-fashioned sewing machine can appreciate what a little bit of an electric motor can do in restoring home sewing to the domestic menage.

And then there is heat. This used to be father's job until he had a son or sons big enough to have the job pinned on them. It is no longer necessary to go down into the basement clad in two or three sweaters, four or five pairs of ear muffs, to say nothing of mittens, and stoke a coal furnace, break several of the ten commandments and smoke up the whole house in the early morning before the rest of the family dared to venture out of bed. Again the handy little button may be pressed. Let there be heat, and there is heat.

All of which leads up to the thought that a great opportunity is ready for the electrical industry to bring out and establish these ideas, to support them by facts and figures and carry the story to the organized industry itself and also to the people at large, and to base this story fundamentally upon the perpetuation, or perhaps the restoration, of the home. Not to attempt to reverse the tide of progress, not at all, but rather to take conditions as we find them and apply those conditions toward bringing about a new concept of home with modern improvements, by which the very progress that we have made industrially shall be utilized in inaugurating a back-to-the-home movement that if carried through successfully will help to remove many of the menaces threatened by the so-called jazz age, and restore the home as an economic and social entity in the lives of our people. Keep the home fires burning—electrically, of course.

Taking the Guess Work Out of Range Advertising

By J. B. Buman

Appliance Sales Manager, Northwestern Electric Company, Portland, Ore.

IN ORDER to learn what effect the electric range advertising conducted during the past few years by the Northwestern Electric Company, Portland, was having on the recipients of that advertising, a survey was conducted by the company among its non-range customers. A number of questions so framed as to bring out in answers the effectiveness of some of the points dwelt on in the advertising, and to reveal the weak points in that advertising, were formulated and addressed to certain customers selected from several different meter routes and from different kinds of residence districts so that the group chosen could be assumed fairly to represent an accurate cross-section of the company's customers not using ranges. These questionnaires were then carried around by the company's salesmen, who personally asked the questions listed and noted the answers, after first establishing confidence by assuring the one questioned that no attempt would be made to sell him anything. Later the results of the inquiry were consolidated and tabulated so that the answers could be reduced to a composite of the knowledge and opinion of the non-range customers about electric ranges and their use.

Obviously the principal object of the survey was to ascertain toward what misunderstood features of the electric range future advertising should be directed. Further, a few questions bearing on some of the ideas dwelt on in past advertising were designed to disclose how well these ideas had been put over, and to what intensity future advertising should continue to stress them. Thus it may be said that the survey was expected to supply the basis for a more intelligent directing of future advertising effort and for eliminating as far as possible the guess-work. To know the sources of resistance and to direct the attack on those sources is to utilize more efficiently the money spent on advertising, and it was with this thought in mind that the survey was undertaken. Some extremely valuable as well as interesting information was gleaned from the results.

Results of Survey

A resume of the consolidated answers to the eight questions asked of 204 non-range customers is as follows:

To the first question, "What is your idea of the cost of an electric range?" eighty answered, "I don't know"; forty-one said, "Reasonable"; and thirty-eight, "Too high." Of the remaining forty-five that answered the question variously, twenty-two set definite figures at between $150 and $200, and two answers were outside that range, namely one at $135 and one at $360. The other twenty-one answered evasively indicating that they didn't know or vaguely thought the price too

high. Further analysis shows that if we deduct those that knew fairly definitely what the cost was plus those that thought it reasonable, there are still left 141 out of the 204 questioned, or 69 per cent that did not know, or entertained a vague notion that the cost was great. Assuming that our group represented an average cross-section of our non-range customers, and agreeing that a fairly general belief that the first cost is high constitutes a material resistance to sales, we must admit that it probably would be advantageous to use some advertising space in the future directed toward elucidation of this point in the hope of breaking down this resistance in some of this 69 per cent.

The second question pertained to operating cost and was phrased as follows: "What do you think of the monthly cost of electric cooking?" Ninety-five answered, "I don't know"; thirty-five said, "Reasonable"; thirty-one, "Too high"; ten, "About the same as gas"; ten, "More than gas"; and eight, "Cheaper than gas." Twelve miscellaneous answers completed the 201 replies received to this question, an analysis of which indicates that 144, or 71½ per cent, needed further education as to this point.

Believing that one of the points of resistance is a widespread and ingrained belief that electricity is slow, the third question was framed to verify or disprove this, as follows: "Do you think the electric range of today is slow?" One hundred and eleven answered affirmatively, forty-five negatively, and thirty were doubtful. Of the eighteen miscellaneous other answers, fifteen leaned toward the belief that it is slow, while three thought it not especially so. Consequently, here was a point on which 76½ per cent of the non-range customers might well be instructed if it is agreed that such a belief constitutes a sales resistance.

How Effective Is Advertising

The next three questions were designed to reveal how well the company advertising had put across the ideas advertised. For some time this advertising had stressed cleanliness, labor saving, temperature control, and excellent results from using the oven. When asked, "Do you know that the electric range is wonderfully clean and a big labor saving device?" 196 answered, "Yes," three, "No," and five evaded, which would indicate that there was little necessity for wasting much valuable space to stress these points further.

To question five, "Do you know that the electric oven is equipped with a temperature control?" the affirmative reply was 174, or 85 per cent, again indicating that this point had been sold effectively. A similar indication, though with a less definite response and a somewhat smaller percentage, was the result of the replies to the sixth question, "Do you know of the fine results obtained in baking with an electric oven?" One hundred and thirty-four, or 65½ per cent, were aware of this much advertised feature of electric cooking.

The last two questions had to do with the use of gas ranges, with the idea of furnishing the company with some ammunition with which to combat the very effective gas competition encountered in Portland. Without giving the specific results of a compilation of the replies received, it might be said that not all gas users were wholly satisfied, that some of the shortcomings of gas as a cooking fuel were revealed, and that the feature of the gas range most admired by gas users is the speed with which the heat is obtained.

It must be obvious from the above that the company secured some excellent data on which to base future advertising and sales efforts. It is understood that the particular questions asked did not exhaust the entire information the merchandising department would like to possess about how people feel toward the use of the electric range, but enough information was secured to indicate with reasonable certainty that the features on which recent advertising has laid particular stress have been fairly well imbedded in the public consciousness, and that there is a noticeable lack of information among the public on certain other points about the electric range. Thus it would seem that a revision of the direction of the company's advertising ought to yield results in new fields hitherto surrounded by an impregnable wall of resistance, and it can be stated that in the future the company range advertising will lay more stress on telling the public that neither the first cost nor the operating cost is high and that the modern electric range is fast, at the same time cutting down on the space used to tell about cleanliness, labor saving, temperature control and oven performance.

Survey Shows Use of Appliances by Power Company Employees

THE Southern California Edison Company recently undertook a survey, in an attempt to ascertain the number of electrical appliances owned and used by its own employees. The tabulated results of this survey should be of interest to every one in the industry.

Twenty-seven per cent of the home owners are using electric ranges, nineteen per cent of the home owners use electric water heaters. The largest ratio of appliances to employees is found under the head of laundry irons, in which it was found that 3,049 laundry irons are being used by 3,010 employees maintaining homes. This would tend to show that the laundry iron has now reached the stage where more than one to a home will be found. The next most popular piece of electric equipment is the toaster, with 1,839 in use. Vacuum cleaners follow very closely, with 1,672. Washing machines have a total of 1,196. The excess of vacuum cleaners over washing machines may tend to prove that the vacuum sales organizations have been more active in their propaganda than the washing machine organizations. The report also indicates that the electric refrigerator still is considered more or less a luxury product, even by those members of the industry who supposedly know better. The total number shown is 107.

The detailed report follows:

Survey made by Southern California Edison Company to ascertain number of electric appliances in use by Edison employees, with other pertinent information.

No. of employees reporting	3,903	Electric incubators	1
No. married	2,690	Electric motor guides	1
No. single	1,213	Electric pianos	3
No. maintaining homes	3,010	Electric refrigerators	107
No. not maintaining homes	893	Electric stills	1
No. owning homes	1,460	Electric cooker-pots	744
No. renting homes	1,777	Floor waxers and polishers	8
No. neither owning nor renting	666	Grills	277
No. using electric ranges	379	Heaters	560
No. using water heaters	291	Heating pads	386
Air heaters	155	Hot plates	13
Battery chargers	319	Immersion heaters	14
Battery eliminators	74	Ironers	65
Bottle warmers	1	Laundry irons	3,049
Bottle washers	1	Miscellaneous motors	47
Chafing dishes	28	Percolators and urns	1,266
Chicken brooders	4	Ovenettes	1
Cigar lighters	5	Ovens	4
Corn poppers	19	Radios	178
Curling irons	1,129	Sewing machines	519
Dish washers	1	Soldering irons	131
Electric blankets	2	Spot welders	1
Electric boilers	1	Table stoves	31
Electric clocks	2	Toy train transformers	6
Electric combs	1	Toasters	1,839
Electric drills	3	Vacuum cleaners	1,672
Electric fans	305	Vibrators	94
Electric hair driers	11	Violet ray lamps	13
Electric hot plates	8	Waffle irons	975
		Washington machines	1,196

Engineering Practice

Uniform Design for 33-kv. Stations Effects Economies

Standardization of Basic Features Cuts Engineering Costs, Speeds Production
Advantages of Both Pipe and Angle Iron Combined in Structures

By FRANCIS CURTIS, The Southern Sierras Power Company, Riverside, California

IN THE design of modern 33-kv. substations it is necessary to consider the various types, such as indoor installations for city distribution, wood-pole and frame structures, and steel-frame substation structures. This article will discuss the latter as standardized for the system of The Southern Sierras Power Company.

For towns of 10,000 to 20,000 inhabitants the steel-frame substation structure was chosen because of appearance and permanency. When the factors governing design (cost primarily, then practicability, flexibility, future construction, and simplicity) are considered, they chiefly decide the type of construction to be used.

Design

To suit the above requirements the pipe or angle-iron structure is best because of its attractiveness, adaptability and durability. The only advantages of wood poles is that they serve well for temporary construction and for emergency cases where speed is a necessity. It is also considered that a town of the before-mentioned requirements would warrant at least a steel-frame structure. Pipe is easily adapted to the mounting of air-break switches, disconnects, bus supports and in fact almost any piece of apparatus that requires mounting on the structure. The apparatus is mounted by means of U-bolts, eliminating the exactitude of drilling and permitting variations and flexibility. Angle iron requires punching, which gives pipe another advantage for equipment mounting.

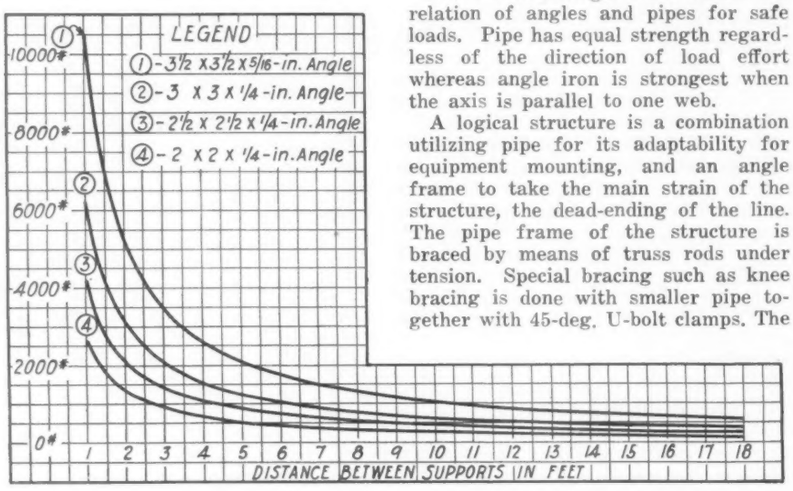

LEGEND
① - 3½ x 3½ x 5/16-in. Angle
② - 3 x 3 x ¼-in. Angle
③ - 2½ x 2½ x ¼-in. Angle
④ - 2 x 2 x ¼-in. Angle
10000#
8000#
6000#
4000#
2000#
0#
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
DISTANCE BETWEEN SUPPORTS IN FEET

Fig. 1. Curves showing safe loads for angles of various sizes.

In the consideration of strength, angle iron may be fabricated and erected to a much greater height than pipe.

The curves of Figs. 1 and 2 show the relation of angles and pipes for safe loads. Pipe has equal strength regardless of the direction of load effort whereas angle iron is strongest when the axis is parallel to one web.

A logical structure is a combination utilizing pipe for its adaptability for equipment mounting, and an angle frame to take the main strain of the structure, the dead-ending of the line. The pipe frame of the structure is braced by means of truss rods under tension. Special bracing such as knee bracing is done with smaller pipe together with 45-deg. U-bolt clamps. The main part of the structure consists of diagonal angle bracing and single-latticed-face columns. All horizontal, upright and tie members are 2-in. galvanized pipe. Loading of all beams is based upon the weight of the apparatus at an extreme fibre stress of 16,000 lb. In addition to equipment load, the weight of one man also is figured in on the beam with a maximum deflection of 0.75 in. in a span of 12 ft. The U-bolt plate cross-type fitting is used extensively. This fitting has a number of very favorable points: it largely eliminates cutting threads, obviates the cutting of pipes to exact lengths, permits greater flexibility and easier future extensions and is stronger than threaded fittings. The major disadvantage is that pipes so fitted do not line up.

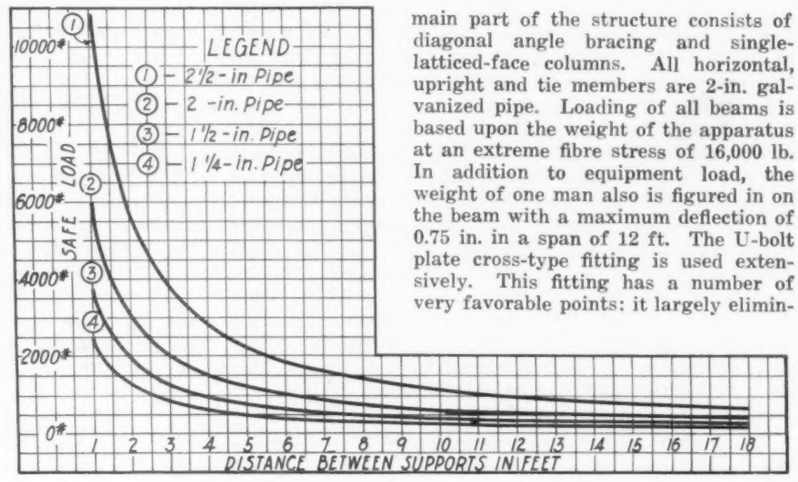

LEGEND
① - 2½ - in Pipe
② - 2 - in. Pipe
③ - 1½ - in. Pipe
④ - 1¼ - in. Pipe
10000#
8000#
6000#
4000#
2000#
0#
SAFE LOAD
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
DISTANCE BETWEEN SUPPORTS IN FEET

Fig. 2. Curves showing safe loads for pipes of various sizes.

Equipment Arrangement

A thing to be kept in mind is the flexibility of the structure. A standard substation should be so designed that it will permit variations in construction. A sructure composed of panels or bays has this desirable feature in that a simple station or a complicated station are both possible with the same general design. One bay in some cases will take care of a 3-phase trasnformer, dead-ending of line, and necessary switching equipment. As the load increases two more bays can be added to provide increased capacity by the installation of a larger bank of single-phase transformers. Buses and oil switches can follow later to take care of the requirements as the load becomes more important. This method banishes the necessity of tying up a large investment on a large structure not immediately required. Further, engineering costs are reduced because of standardized design. Arrangement of the substation is governed by the number of 33-kv. lines and the importance of the substation. An

important load naturally requires a switching arrangement that will insure continuity of service. In Fig. 3 is shown a station with transfer, operating, and transformer make-up buses, and with disconnects and oil switches as they appear.

This type of sub is on the 33-kv. loop where it necessitates fairly important switching facilities. Line air-break switches are installed on the 33-kv. feeders on top the angle-frame structure. These have the advantage of being able to clear the station equipment and buses to permit work on any piece of equipment. This feature obviates the necessity of opening the nearest line switch to work on bus supports, arrester, or choke coils, as everything is cleared up to the air-break switch. At a point where the vertical down-bus branches to either transfer switch or oil circuit breaker disconnects, provision has been made for the installation of 33-kv. instrument transformers. This location has its advantages and disadvantages, which are about even. When the line oil switch is by-passed by means of the transfer switch, potential and current are still obtainable for metering. Still, when it is necessary to work on the instrument transformers the air-break switch must be opened.

Another plan in general use is to install instrument transformers between oil switch and oil switch disconnects in order to perform repairs without a service interruption. In view of the fact that working on instrument transformers is not a general occurrence and that the sub is operated on loop circuit both methods have equal merit. The switching arrangement consists of the customary operating and transfer buses. Arrangement of a double bus is possible by the addition of an oil circuit breaker on the transfer bus.

Station Grounding

A thing of no little importance is the grounding of all non-current-carrying parts. As is required by the safety code of California, arrester grounds must not be connected to any other station ground by means of copper conductor, contact by means of the arrester ground wire makes with the steel structure not being considered. This is complied with as each arrester is connected to a ground cone and all ground cones are connected together, but not tied to any other station ground. All ground wire is the same size as that of the line conductor and in some cases larger as No. 2 copper strand is considered the minimum safe size. Oil switch cases, transformer cases, and instrument transformer neutrals all are connected to a common ground. The steel structure also is grounded in two separate places to this station ground. The station ground consists of at least three carbon ground cones in separate locations in soil as moist as is obtainable. Steel fencing surrounding the substation is tied to the station ground in at least two places. All gates and gaps in the fence are solidly bridged with copper conductor placed in the earth. Owing to the fact that all transformers on the 33-kv. loop system are delta connected there is no call for a special station ground as would be required in the case of a star-connected system.

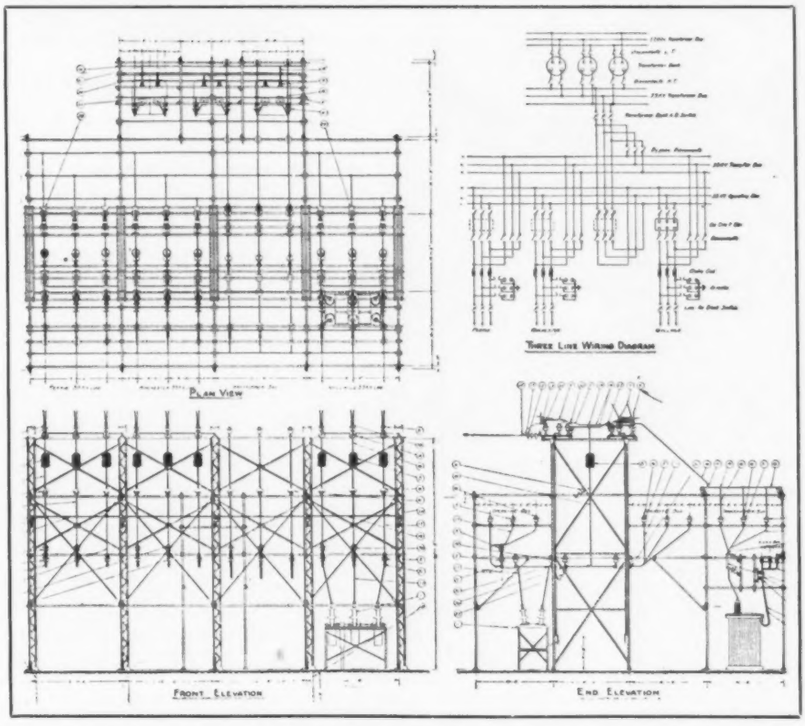


Fig. 3—Plan, elevations and wiring diagram for typical 4-bay, 33-kv. substation utilizing a combination angle-iron and pipe-frame rack.

Transformer Arrangement

The standard 4-bay structure was designed with the idea in mind that it would prove adequate for the installation of two 2,000-kva. transformer banks as an ultimate capacity. The

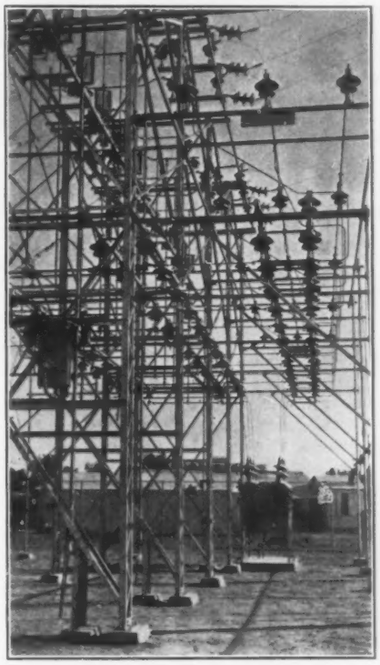


Fig. 4. A typical rack section.

bays would consist of two 33-kv. line bays and two transformer feeder bays. At present the average capacity of the transformer banks installed at the various 33-kv. subs is 1,500 kva.

Transformer foundations were designed for moving transformers on pipe rollers because the advantages of the transfer track were considered to be not worth the cost for these small substations. As all transformers are self cooled, no special water piping system and no cooling tower are required.

Station Surroundings

Standard 33-kv. substations, switch racks and grounds are lighted by floodlights mounted on ornamental pipe lighting standards. These lights are controlled by means of a time switch as the lighted station has quite an advertising quality.

Fencing the substation is accomplished by an 8-ft. chain-link fence. All pipe fence posts are set in concrete and corners are braced rigidly. This type of fence is rather costly, but the benefits of strength, durability and appearance justify the expenditure.

Grounds beneath and surrounding the structure are surfaced with road oil and then covered with granite screenings. The use of road oil tends to keep out the abundant California growth of undesirable vegitation. The gravel is rolled down over the road oil and gives the ground a smooth, finished appearance.

Collapsible Forms Used for Lining Canal

Ten-Section Arrangement Speeds Work on 6,800-ft. Power Canal on Prospect No. 2 Project

A NOVEL collapsible and easily movable form for use in lining a power ditch was designed by G. F. Phythian, general superintendent of construction for Byllesby Engineering and Management Corporation, for use on the Prospect No. 2 development of The California Oregon Power Company. This form, the details of which are shown in the accompanying illustrations, greatly simplified and facilitated the placing of a smooth lining in the power canal.

The length of open canal between the intake at the diversion dam and the forebay of the Prospect No. 2 plant is approximately 6,800 ft. The lined section of this canal has a top width of 27.7 ft. and a bottom width of 9.7 ft., and is designed for a water depth of 8 ft. with a freeboard of 1 ft. The lining is a minimum of 6 in. thick and varies only slightly throughout the entire length of the canal. In some one or two places it was necessary to build a supporting form for the exterior face of the lining, but in most cases the face was laid directly against the sloping side of the open ditch.

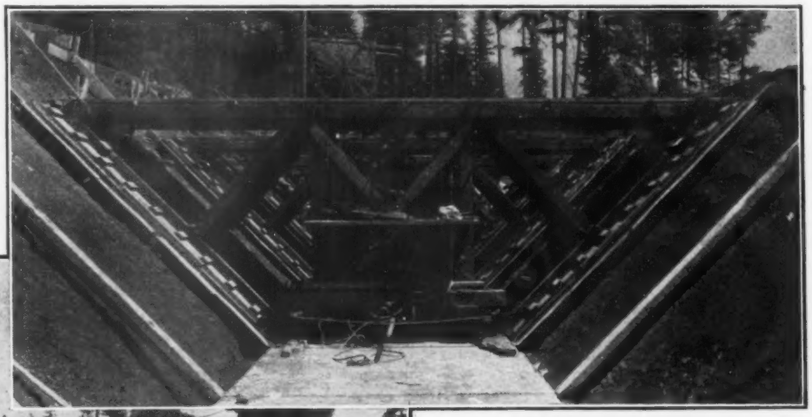
The system used called for the laying of the floor slab of the canal first. This floor slab was laid for some distance ahead of the main lining operation and was left with a keyway to provide a watertight joint with the side slabs when they were placed. The system of placing the side slabs was novel in itself, there being ten of the described forms in use. These ten forms were so arranged that it was possible to keep them all in operation at the same time and to move them along all at the same time, keeping them in the same relative order, thus obviating the necessity of lifting a section of form and moving it on ahead of another section of form. This was made possible by arranging the ten movable forms along the ditch so that five forms were working in a group. The first group was arranged for alternate slabs along both sides of the ditch at once. The second group of five forms then followed up for casting the remaining intermediate slabs and completing the lining for a length of 100 ft. The necessary keyway was provided in each slab and the joints made watertight by the use of felt and asphaltum.

Concrete was hauled from a central mixing plant located at the dam, all of the concrete being delivered by a construction railroad from this one point. A train of ½-yard cars pulled by a gas locomotive did the hauling. There was one Plymouth and one Milwaukee locomotive in service on the job, but only one was used in hauling concrete. Concrete was designed as 2,500-lb. concrete on a 1:4:4 mix.

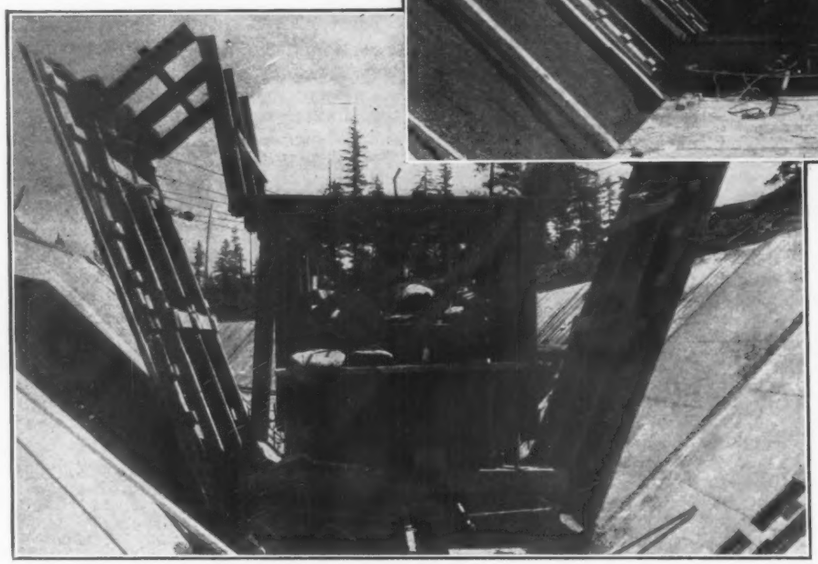
Forms were constructed in 10-ft. sections, thus comprising 100 ft. of forms. These ten sections were stretched out over 300 ft. of the ditch with the head group of five working on the first group of slabs and the following group of five working on the final group of slabs as before mentioned. The net progress possible with this araringement was 100 ft. per day, or one move per day for each form.

The form sections were lined up by a center line marked on the bottom slab. The mixed concrete was poured directly from the cars into the forms on the near side and trundled across the top of the forms for the far-side lining of the ditch. This system of construction resulted in an entirely satisfactory job with a very smooth finish to the lining.

The movable form sections were usable either on tangents or on curves, lending themselves equally well to either type of construction. The 10-ft. length of each form section was short enough to form essentially a smooth, curved surface to the lining of the canal on curved sections. Of course, there was some taper in the slabs on the curved sections, but inasmuch as the side guides on the form face were readily adjustable it was a simple matter to allow for part of the taper in the first group of slabs and then to follow along with the second group of forms, filling in the intermediate slabs. In the case of the second group of slabs it was unnecessary to use side guides as the form face was lowered down into close contact with and overlapping the adjacent slabs. Thus the pour was worked closely into the L-shaped keyway left along the edge of the first set of slabs.



The forward group of five form sections ready to cast the first group of lining segments. Note the felt gasket in place on the keyway form.



One of the ten form sections with the wings raised and ready to be moved. Note the "gang-operated" blocks, the hinges, the wheels and the steering arrangement.

The framework of the form sections consisted of 6 x 6-in. uprights, 4 x 6-in. main braces, 4 x 6-in. side timbers and 2 x 12-in. facing sheathed over with sheet metal to give a smooth surface. The removable struts from the center frame of the forms down to the midpoint of the stringers behind the form face were 4 x 6-in. timbers, arranged to be dropped out of place to permit the form faces to be raised when the form section was to be moved. The original design provided flanged car wheels to run on small rails to facilitate the movement of the sections. However, it was found unnecessary to go to this addi-

Synchroscopes Now Operated by Vacuum Tubes

Vacuum tubes developed primarily in the field of radio now have been applied in an entirely different field, that of a vacuum-tube synchroscope. This apparatus gives a direct indication and shows the difference in speed without any time lag. The equipment provides the usual fast, slow and synchronous indications without the use of instrument potential transformers.

Potential from the lines to be synchronized is obtained from a capacitance transformer. Standard oil-filled bushings of transformers, oil circuit breakers or other apparatus can be replaced by a modified bushing with a capacitance transformer for furnishing potential to the vacuum-tube apparatus. Where such bushings are not in use, the capacitance transformer can be supplied in a separate tank which can be installed either outdoors or indoors. The voltage obtained in this way is in phase with the line-to-neutral voltage of the system. A capacitance transformer must be provided at each point where a potential transformer would be necessary if transformers were used.

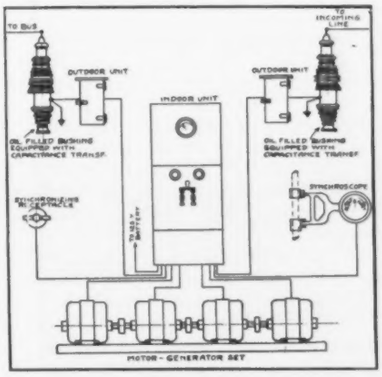


Fig. 1. Synchroscope connection diagram.

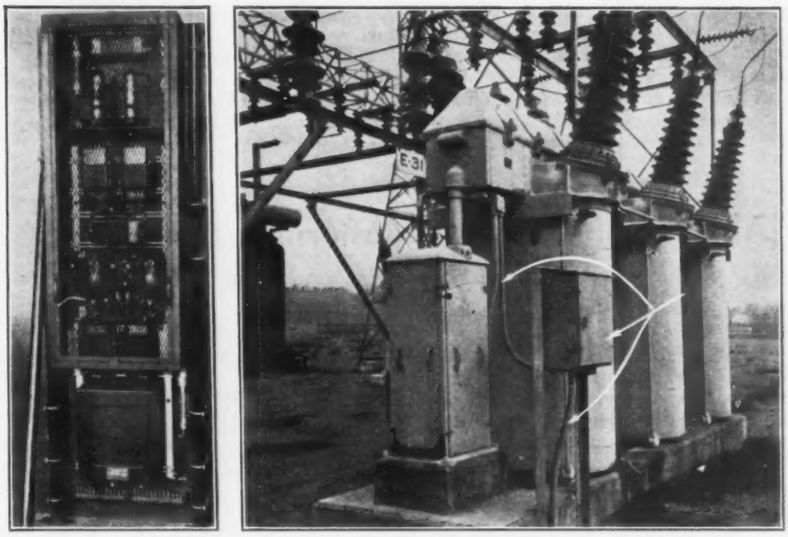


Fig. 2. (Left) rear of panel of 50-watt amplifier for synchroscope. (Right) outdoor end of a typical vacuum-tube synchroscope installation. The unit and leads are indicated by the arrows.

The potential obtained from the capacitance transformer is impressed upon the grid-filament circuit of a vacuum tube and amplified. This tube should not be more than 50 ft. from the transformer. The low-power amplifier is built into a weatherproof housing for outdoor mounting. One such amplifier is required for each bus and line to be synchronized. The low-power outdoor amplifiers require a five-wire multi-conductor cable with 500-volt insulation between the amplifier and the substation where amplifiers are installed.

The station equipment consists of a tube and control unit, a motor-generator set, and the synchroscope. The tube and control unit consists of two 50-watt amplifiying tubes and their associated equipment. These tubes will amplify the energy received from the low-power amplifiers sufficiently to operate the indicating synchroscope. The high-power amplifying equipment will take care of any number of synchronizing points at one substation. Proper switching means are provided to take care of a number of circuits where this is necessary.

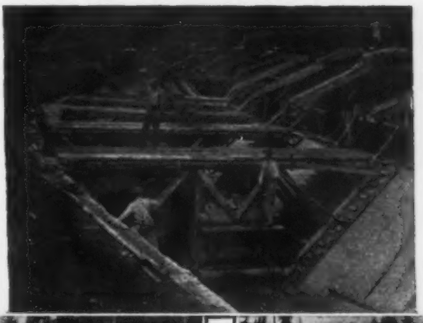
Where synchronizing potential of the proper phase relation from potential transformers is available from one side of the line, this potential may be applied to one winding of the synchroscope and tube equipment used to supply potential to the other winding.

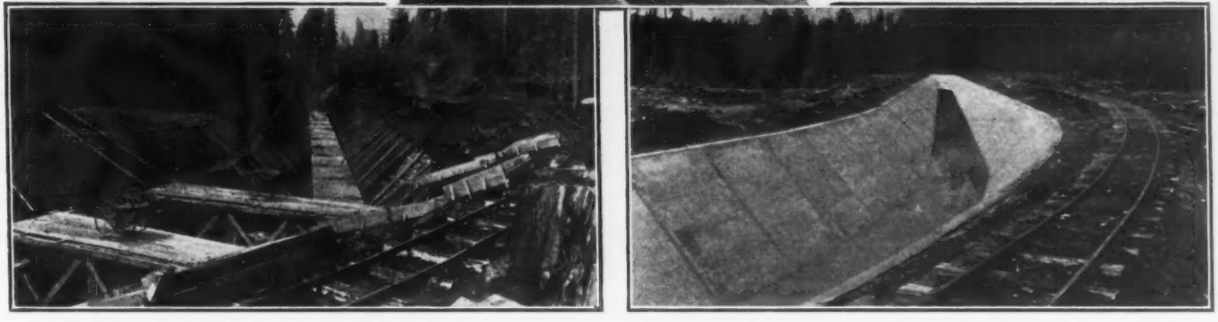
The motor-generator set consists of a driving motor, a filament alternator, a bias generator, and a high-voltage double-commutator generator. The driving motor requires approximately 1,000 watts and operates from the station battery, or, with a different type of

---

tional expense and wheels without flanges were installed, these wheels running on planks laid on the bottom slabs.

In order to prevent the forms lifting and floating when the concrete was puddled under them they were weighted down with rock ballast. The form sections were moved ahead by means of block and tackle, the forward pair of wheels being aranged so that the forms could be steered into place with the least possible effort.





Placing a 6-in. concrete lining in the ditch section of the flow line of the Prospect No. 2 plant of The California Oregon Power Company. Left—looking ahead along the ditch showing the grading prepared, the bottom slab in place, and the keyway forms partially in place. Center—second group of five forms in place ready to cast the second batch of sections to complete the lining. Right—completed canal showing smooth surface effected on both tangents and curves.

motor, alternating current can be used. The filament alternator supplies the filament excitation for all the tubes. The bias generator supplies bias potential for all the tubes and excitation for the high-voltage generator, which supplies direct current at 500 and 1,000 volts for the plate supply of the amplifiers.

The insertion of the synchronizing plug starts the motor-generator set. The operation of the synchroscope itself is the same as if potential transformers were being used.

Analysis of Current Transformer Tests—IX

Effect of Certain "Misconnections"

By E. C. Goodale, Tacoma, Washington

IN articles VII and VIII of this series it was stated that in "misconnections" of current transformers in which their secondaries are connected in series the current actually flowing in the common secondaries is the vector average of the currents in their primaries, divided by the ratio. That is, for two current transformers with series secondaries apparently boosting it is one-half the vector sum of their primary currents, divided by the ratio; when apparently bucking it is one-half their vector difference, divided by the ratio.

The following single-phase tests verify this "vector average" law. In Fig. 29(A) two like current transformers with ratios 10/5 are shown "misconnected" with secondaries in series and apparently boosting. Hence the common secondary current (I_b) should vectorially equal ½ ($I_A + I_B$), divided by the ratio, 2. The vector diagrams of Fig. 29 (B and D) verify this since I_b, the common secondary current, resulted in a test value of 3.2 amp. at an angle of —11 deg. This is exactly one-fourth of 12.8, the vector sum of $I_A + I_B$, as shown in Fig. 29(D). Dividing 12.8 by 2 gives the vector average of 6.4 on the basis of primary current. Dividing again by 2, since the ratio is 10/5, gives 3.2 amp. which agrees with the actual test readings both in value and phase as shown by I_b in Fig. 29(B).

Apparatus used in making the test, as well as methods of computation of phase relations were described in detail in the April and June issues of Electrical West, pages 210 and 464. The reference voltage used was $E_1 = 90$ volts with its vector position assumed as horizontal and to the right. The phase relations of all other vectors with respect to it then were determined by the previously described method. The reference current was 10 amp., in phase with E_1, obtained by attaching a pure resistance load to E_1. In fact both loads, (BD and A'C') were lamp banks. In Table VII are listed the test data:

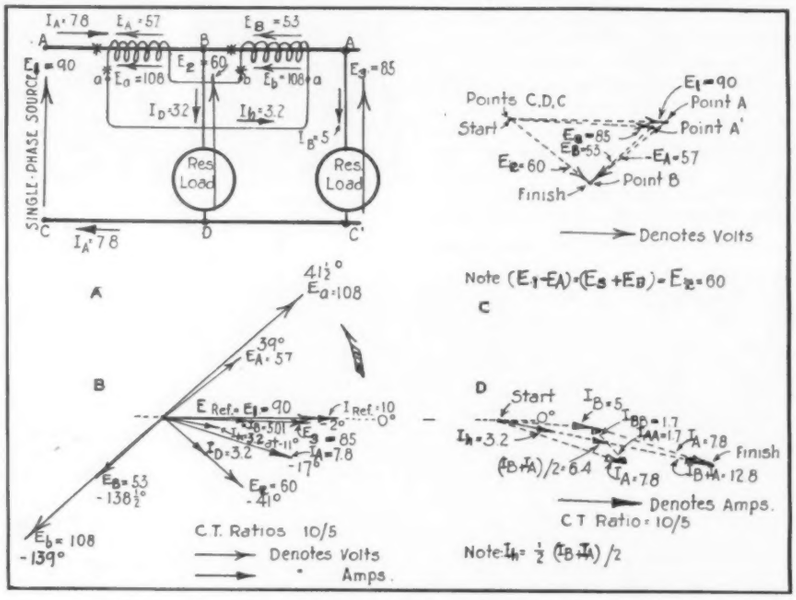


Fig. 29. Connection error resulting in series secondaries, boosting.

This misconnection provides a further illustration of Kirchoff's laws. Kirchoff's current law is illustrated by the fact that current I_A (total current entering junction point B), vectorially equals $I_B + I_D$ (total current leaving point B). The vectorial addition of $I_B + I_D$ is not shown, but can be made easily by the reader by adding $I_B + I_D$ at their proper angles in a heel-and-toe order. Their resultant, that is, from the start or heel of I_B to the finish or toe of I_D will equal I_A.

The modification of Kirchoff's voltage law set forth in Article VII in the November, 1927, issue of Electrical West is illustrated in Fig. 29(C). That is, the voltage drop across the load between points B and D, considered in the direction from D to B, is found to be 60 volts at an angle of —41 deg. The result is the same whether going by way of DCAB or DC'A'B. As a matter of interest it may be observed that the current I_D flowing through this load from B to D is in phase with the voltage E_2, as of course it should be. It was only a matter of coincidence that its numerical value resulted also in 3.2 amp.

In these tests, due to the low voltages and low ratios used, the back induced voltages across the current transformer primaries are large enough compared with the source voltages to greatly affect the values and phase relations of the currents flowing to the loads with respect to the source voltages. The lower the source voltages used and the lower the current transformer ratios used the greater will be this distorting effect. In commercial practice, however, usually the source voltages or the ratios are higher so the voltage drop across the primaries of the current transformers when their secondaries are in series are in most cases not high enough to affect the load appreciably.

It was mentioned in Article VII that the vector difference between the secondary and primary currents, on a 1/1 ratio basis, is magnetizing current. Under normal conditions the magnetizing current is extremely small, whereas under series secondary conditions it is very large, magnetizing the core intensely. Fig. 29(D) shows the two magnetizing currents, I_{AA} and I_{BB}, on the basis of primary amperes. It may be seen that they are equal and opposite. This is as it should be, since the induced secondary voltages due to them must be equal and opposite in order to agree with Kirchoff's voltage law. That is, in starting from point b and going to point a, if by way of winding A the assumed direction of induced secondary voltage, E_a agrees with our direction of progression, but if by way of winding B, E_b is opposed to our direction. The resultant voltage from b to a must be

Table VII—Test Data

	Volts or Amp.		Watts-Switch Down		Cosine of Angle	Angle (Deg.)	Registration-Switch Up	Lag or Lead
E_1	90	+	900	+	1.0	0	Very slight change	In Phase
E_2	60	+	450	+	0.75	41	Decreased Pos.	Lag
E_3	85	+	851	+	0.999	2	Very slight change	Lag
E_A	57	+	440	+	0.772	39	Increased Pos.	Lead
E_B	53	—	400	—	0.755	139	Increased Neg.	Lag
E_a	108	+	810	+	0.75	41½	Increased Pos.	Lead
E_b	108	—	810	—	0.75	138½	Increased Neg.	Lag
I_A	7.8	+	670	+	0.953	17	Very slight change	Lag
I_B	5.0	+	450	+	0.999	2	Very slight change	Lag
I_D	3.2	+	220	+	0.763	41	Increased Pos.	Lag
I_b	3.2	+	290	+	0.98	11	Very slight change	Lag

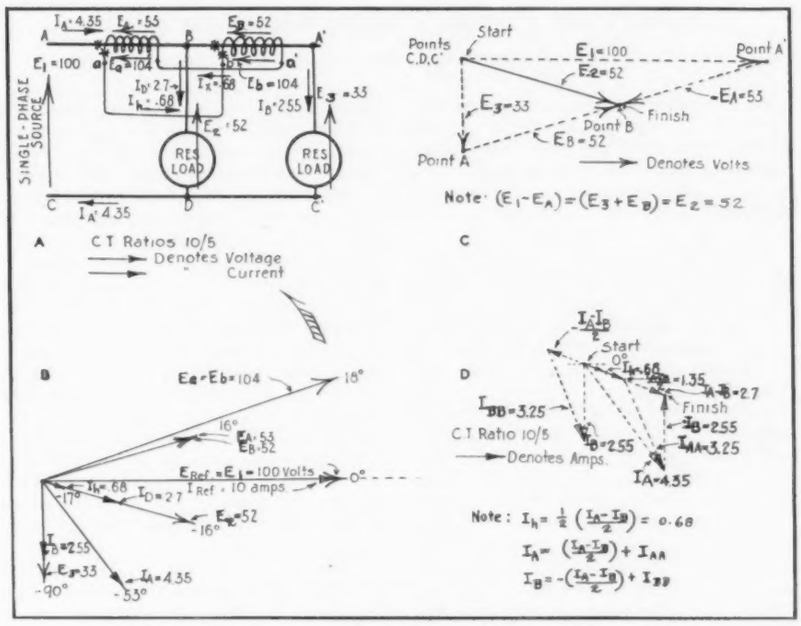


Fig. 30. Connection error resulting in series secondaries, bucking.

the same, however, regardless of route chosen. Therefore, since there are no other induced voltages or voltage drops encountered en route from b to a, it is evident that E_a must equal $-E_b$. Fig. 29(B) verifies this. Inasmuch as the current transformers were of equal ratio and like design it is evident that the magnetizing currents I_{AA} and I_{BB}, producing the fluxes which produced E_a and E_b must be equal and opposite and lagging their respective voltages by nearly 90 deg. In the tests the actual angle was approximately 84 deg., the difference between it and 90 deg. being apparently due to the heavy losses in the highly magnetized cores.

The test was repeated, reversing the secondary connections of current transformer **B** to buck rather than boost secondary **A**, as shown in **Fig. 30(A)**. Test data are listed in Table VIII. Reference voltage in this case was $E_1 = 100$ volts and reference current in phase with E_1 as before was 10 amp. Fig. 30(B) shows the test values plotted to scale.

Kirchoff's voltage law is illustrated again in Fig. 30 (C) between points D and B. Fig. 30(D) again illustrates the "vector-average" law, I_h this time being the vector average difference of $\frac{1}{2}(I_A - I_B)$, divided by the ratio 2. The vector resultant of $I_A - I_B$ gives a value equal to that of I_D or 2.7 amp. at —16 deg. Dividing 2.7 by 2 gives a vector-average difference of 1.35 amp., and dividing again by 2 because of the 10/5 ratio gives 0.675 amp. at —16 deg., agreeing closely with the test result of 0.68 amp. at —17 deg.

It may be observed that the two magnetizing currents, I_{AA} and I_{BB} are equal and in phase. This is due to the fact that the induced voltages, E_a and E_b must be equal and in phase since the current transformers are of the same ratio and like design and the voltage derived in going from b to a must be the same regardless of route chosen. If by way of winding **A** our direction agrees with the direction arrow of E_a. If by way of winding **B** it agrees with E_b. Hence they must be identical and in phase and consequently the magnetizing currents producing the fluxes which produce them must be equal and in phase, as shown in Fig. 30(D).

From the results of these two tests the "vector-average" law was determined and verified by the 3-phase series tests to be discussed in succeeding articles.

Single-phase series boosting will result if two current transformers are connected differentially and the common secondary shunt lead is broken as at **X** in Fig. 31. Normally:

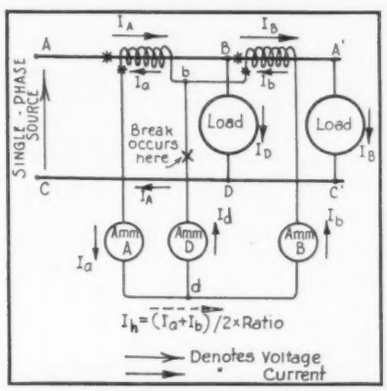


Fig. 31. Break in differential connection resulting in series boosting effect.

Ammeter A reads I_A divided by the ratio.
Ammeter B reads I_B divided by the ratio.
Ammeter D reads I_D divided by the ratio = (I_A vect. minus I_B) divided by the ratio.

However, when secondary shunt lead breaks at X:

Ammeter A reads ½(I_A vect. plus I_B) divided by the ratio.
Ammeter B reads ½(I_A vect. plus I_B) divided by the ratio.
Ammeter D reads zero.

Dotted direction arrow I_h shows direction of current flow assumed in case of open circuit at X.

Single-phase series bucking will result when two current transformers in a so-called totalizing connection have their common secondary shunt lead broken as at X in Fig. 32. Normally:

Ammeter D reads I_D divided by the ratio.
Ammeter B reads I_B divided by the ratio.
Ammeter S reads $\frac{I_A}{\text{ratio}}$ = (I_D vect. plus I_B) divided by the ratio.

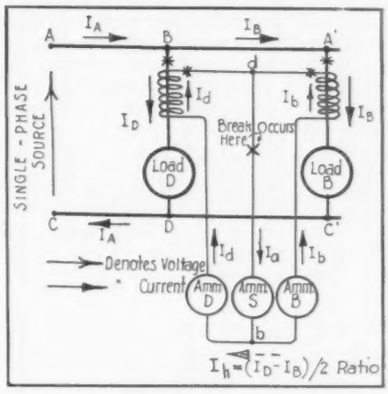


Fig. 32. Break in "totalizing" connection resulting in series bucking effect.

In this case, when secondary shunt lead breaks at X:

Ammeter D reads ½(I_D vect. minus I_B) divided by the ratio.
Ammeter B reads ½(I_D vect. minus I_B) divided by the ratio.
Ammeter S reads zero.

Dotted direction arrow I_h shows direction of current flow assumed in case of open circuit at X.

It should be remembered that secondary series connections discussed are normally the result of accident and not of intent. Hence the "vector-average" law finds its chief use in determining what has taken place in the current transformers, meters and relays while so erroneously connected.

EDITOR'S NOTE: This is the ninth of a series of articles built around actual tests of various instrument transformer connection as made by the author in the meter testing laboratory of the Syracuse Lighting Company, Syracuse, N. Y. The next article will deal with meter connections.

Table VIII—Test Data

	Volts or Amp.		Watts Switch Down		Cosine of Angle	Angle (Deg.)	Registration Switch Up	Lag or Lead
E_1	100	+	1,000	+	1.0	0	Very slight change	In Phase
E_2	52	+	500	+	0.96	16	Slight change	Lag
E_3	33	+	5	+	0.015	89	Negative	Lag
E_A	53	+	510	+	0.96	16	Increased Pos.	Lead
E_B	52	+	500	+	0.96	16	Increased Pos.	Lead
E_a	103	+	980	+	0.95	18	Increased Pos.	Lead
E_b	103	+	980	+	0.95	18	Increased Pos.	Lead
I_A	4.35	+	260	+	0.6	53	Increased Pos.	Lag
I_B	2.55	+	0	+	0.0	90	Positive	Lag
I_D	2.7	+	260	+	0.96	16	Very slight change	Lag
I_h	0.68	+	65	+	0.955	17	Very slight change	Lag

Semi-Portable Substations Used in Portland

Hoyt substation of the Northwestern Electric Company, Portland, Ore., typical of the class of station used to pioneer new districts, is shown herewith. These stations are known as semi-portables and may be taken down and moved when the time comes for a larger station. In fact, it is possible to move these stations as a unit by raising them and placing wheels or rollers under them. The whole structure is built and mounted on a steel frame, comprising a very rigid and compact unit. The four corner posts are the only parts that cannot be salvaged when the station is moved. The ventilating screens are precast in the concrete slabs that are used to build up the ground segment of the building.

It is customary to locate these stations on property where larger standard substations can be built at such time as load may require. At the present time the company is using three of these stations with an installed capacity of 600 kva. each and two with an installed capacity of 1,000 kva. each.

The stations are fed from an 11-kv. line and are arranged to distribute at 2.4 kv. Standard equipment consists of three 11/2.4-kv. delta-delta connected transformers and two voltage regulators connected open delta. Air-break switches are installed on neighboring pole tops to provide isolation of the station on both the high tension and the low tension side when occasion requires. In addition to the pole-top switches on the 11-kv. side, the high-tension line is fused inside of the station. Both the 11 and the 2.4-kv. lines are carried into the station through underground cables.

A substation used by the Northwestern Electric Company of Portland, Ore., to pioneer newly developing districts.

Even though these temporary substations are constructed with a plain sheet-metal exterior, they are kept freshly painted and present a neat and acceptable appearance.

Chart for Power Factor Determination

By A. R. HAYNES, Department of Light and Water, Tacoma, Washington

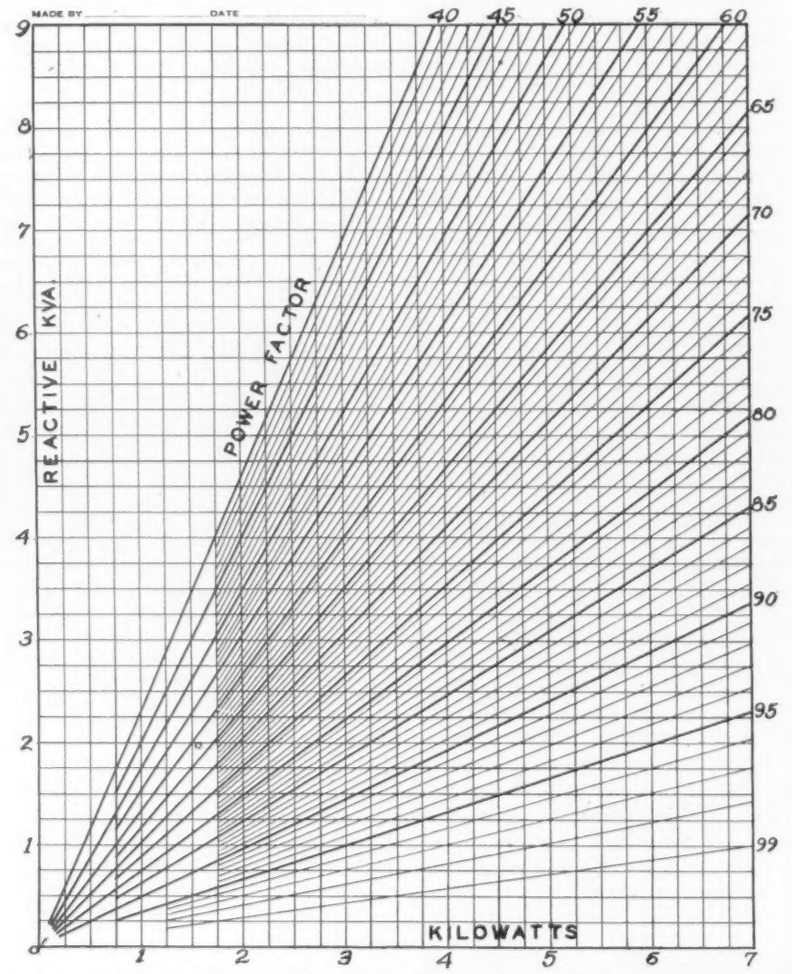
An operator generally is more concerned with the power factor of his station than with the individual power factors of his lines or generators. The accompanying chart will be found particularly useful in determining this power factor.

In recent practice reactive-kva. meters frequently are installed in the place of power-factor meters in order to study the magnitude and distribution of the wattless current circulation in the system. When reactive-kva. and kilowatt readings on a group of generators or lines are available the power factor of the group may be found directly by totaling separately the kw. and reactive-kva. components. Then locate the point on the chart corresponding to these co-ordinates and read the power factor from the diagonal line nearest to that point. This gives a result close enough for practical purposes.

When the only readings available are the power-factor and kw. readings on individual machines or lines the chart still may be used. In this case the reactive-kva. components first must be found. This is done (see chart) by tracing upward from the point corresponding to the kw. reading to the diagonal line corresponding to the power-factor reading. Then the value of the wattless component involved may be read from the left-hand scale opposite the point just located (intersections of diagonal power-factor line and the vertical kw. line). After the reactive-kva. components have been found for each generator or line the power factor of the group may be determined in the same way as outlined in the preceding paragraph.

Although the chart is designed for kw. values and kva. values up to 9 it is of universal application. A few examples will make clear its application in cases where readings appear to be outside this range.

Considering the ratio of the reactive-kva. and power (kw.) components as a fraction, the value of this fraction is unaffected by multiplying or dividing both numerator and denominator by the same number. Thus with meter readings of 8,200 R-kva. and 10,800 kw. the



A handy chart for figuring station power factor. The range of the chart may be extended at will by using proper multipliers for the kw. and kva. scales.

fraction $\frac{\text{kva.}}{\text{kw.}}$ becomes $\frac{8{,}200}{10{,}800}$. Dividing both values by a figure that will bring them within the chart range the fraction or ratio, becomes:

$$\frac{8{,}200 \div 2{,}000}{10{,}000 \div 2{,}000} = \frac{4.1}{5.4}$$

Now referring to the chart, locate the point on the vertical (kva.) axis corresponding to the kva. value 4.1. Then trace to the right along the horizontal line passing through that point (4.1) to its intersection with the vertical line which passes through the horizontal (kw.) value 5.4. The diagonal line nearest to this intersection point is diagonal 80 which indicates that the power factor is 80 per cent.

Again, for 8,750 R-kva. and 7,500 kw., and using a decimal multiplier instead of a large divisor, the ratio becomes:

$$\frac{8{,}750 \times .004}{7{,}500 \times .004} = \frac{3.5}{3.0}$$

As described above, the location of these co-ordinates on the chart will be found to be on the diagonal, indicating a power factor of 65 per cent.

For a station with, say, three different machines which may be designated as units A, B and C, the total station load (A + B + C) = 50,000 R-kva. and 40,000 kw. The ratio then is $\frac{50{,}000}{40{,}000}$ which obviously may become ratio $\frac{5.0}{4.0}$ which is within the physical range of the chart. Located as above these co-ordinates indicate the power factor to be 62.5 per cent.

With individual readings:

A = 1,200 kw. at 95-per-cent power factor.
B = 1,500 kw. at 83-per-cent power factor.
C = 5,300 kw. at 87-per-cent power factor.

The reactive component for A is found by multiplying 1,200 (kw.) by .005 to bring it on the chart scale at 6 (kw.). On the chart at 6 kw. and 95 per cent power factor read the reactive component of 2 kva. Dividing this by .005 gives the true reactive component of 400 R-kva. Use some factor, for instance, 0.003 or 0.004, for unit B. C already is within the chart range when divided by 1,000. Whence we have:

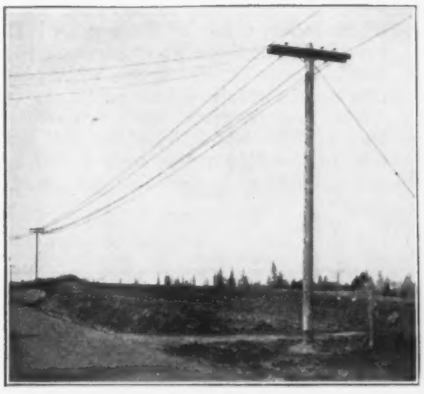
	R-kva.	Kw.
For A,	400	1,200
B,	1,000	1,500
C,	3,000	5,300
Total	4,400	8,000

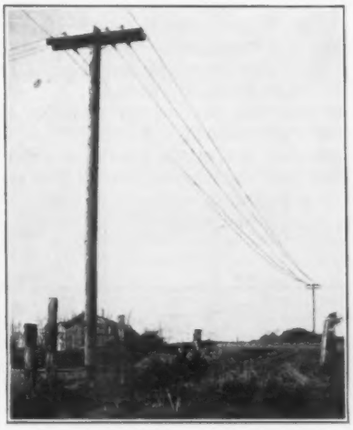
Ratio, $\frac{4{,}400 \div 2{,}000}{8{,}000 \div 2{,}000} = \frac{2.2}{4.0}$. These co-ordinates on the chart indicate a power factor of approximately 87.5 per cent for the units themselves.

With a few minutes practice all ordinary power-factor and component problems may be solved easily by use of the chart.

Electric snow melters are coming into more common use where the accumulation of snow may interefere seriously with the operation of important lines of street and interurban railways. The heater units are installed at important track switches in such a way that there is sufficient heat to prevent the collection of snow or the formulation of ice that would hinder switch operation. Power is supplied from the trolley line. Utilization of the electric heaters, which may be cut into service when needed, forestalls possible tie-ups incident to sudden storms and obviates the necessity of recruiting an emergency crew of men upon short notice.

Economical Rural Line Construction





The problem of constructing 7 miles of primary distribution line by the Portland Electric Power Company to serve 45 rural customers in the Happy Hollow district near Portland, Ore., resulted in the use of several novel features. Inasmuch as the total possible load to be picked up by this 7-mile extension was definitely limited it was necessary to keep the investment cost of the line and its equipment down to a minimum. To keep down the conductor weight and make possible the use of 300-ft. spans on 35-ft. poles, aluminum conductor was used throughout in the construction. Both primary and secondary leads are carried on one arm.

The 2.2-kv. single-phase primary of No. 4 aluminum steel-reinforced cable occupies the two outside positions and the 3-wire 220-volt secondary of No. 2 aluminum cable, also steel cored, is carried on the inside positions. No operating difficulties have been experienced due to this type of construction and arrangement. The amount of sag allowed for each span is 2½ ft. Aluminum sleeves were used for all splices, aluminum clamps were used on the corners and aluminum clamps with copper bushings on the side were used for all service taps. The accompanying three illustrations show typical portions of this line. Secondary service is supplied from 16 independent centers along the line, each fed by a separate transformer ranging from 2 to 7½ kva. capacity.

At the left is shown a typical tangent section of line with the single-phase primary going straight through and 3-phase 220-volt service lead dropping off. In the center may be seen another similar section of line, while at the right is shown one of the transformer poles from which radiate the local secondary feeders. In the first two pictures it may be noted that a guy takes the strain of the dead-ended secondary conductors. Among the 45 rural customers served by this line, 13 are using electric ranges.

Ideas for the Contractor

"Old Man Overhead" Is Under Investigation

California Electragists Discover Need for Basic Understanding of Costs of Doing Business and of Ways to Keep Track of Them

LIKE the Old Man of the Sea whom Sinbad the Sailor generously offered to carry across the stream, but who would not get off on reaching the other side, those things which are grouped under the general heading of "overhead" are hard to shake off once their tentacles are clamped about a business.

And the insidious thing about overhead, like halitosis, is that the victim very seldom realizes it. Those who are aware of its presence, moreover, hardly know what to do about it. A mere mouthwash will not cure halitosis, nor will a whitewash of the books cure overhead. The roots of both affilications lie in the condition of the system itself.

One of the first and most important means of attacking either is to get a clear and complete diagnosis to determine the cause and then the method of remedy suggests itself.

The overhead halitosis of a contracting business has some fundamental symptoms by which it may be detected, even as by the innocent truthfulness of a little child, when "even your best friends will not tell you."

The income tax statement is one dead give-away. The bank balance is another.

An adequate bookkeeping and **cost accounting** system is the best. It is best because not only does it show when undue overhead expense is present but also it can be used to track it down. It also furnishes the best means of checking up on its cure.

> *"And the insidious thing about overhead, like halitosis, is that your friends will not tell you."*

How Widespread is the Disease

No possible conception of the extent to which a lack of correct understanding of overhead prevailed was available until the last estimating lesson of the California Electragists had made its rounds. During the course of this lesson, as a simple matter of checking up and to bring actual conditions into focus, a simple problem was given to all those attending the meeting. The problem is given in Table II.

In the first part of the problem the calculations turned in to show the percentage of the man's overhead yielded answers of anywhere from 15 per cent to 35 per cent.

The mistake most commonly made was that of becoming mixed up on the method of determining the percentage of overhead. Those who took in at a glance that the overhead costs of $6,250 were 25 per cent of the total business (selling price) of $25,000 did not know how to arrive at finding that percentage should the figures have been less obvious.

In other words, overhead is figured as a percentage of selling price. Thus in this case $6,250 is divided by $25,000, giving 25 per cent as the percentage of overhead.

It was in the second part of the problem, that of completing the estimate, however, that the greatest divergence was evidenced. Practically all the answers turned in showed that the percentage of overhead and of profit were merely tacked on. In other words, where the correct overhead of 25 per cent had been figured, 25 per cent of the $100 prime cost was taken rather than of the selling price, with the result that practically all those who undertook the problem cheated themselves of a portion of the overhead and profit.

The answer given most frequently was $137.50, which is adding 25 per cent to the $100 prime cost, and then adding another 10 per cent for profit.

TABLE I

Percentage of Net Profit Desired	Overhead Percentages (Cost of Operating Business Divided by Gross Sales)																				
	15%	16%	17%	18%	19%	20%	21%	22%	23%	24%	25%	26%	27%	28%	29%	30%	31%	32%	33%	34%	35%
2½%	21	23	24	26	27	29	31	33	34	36	38	40	42	44	46	48	50	53	55	58	60
5 %	25	27	28	30	32	33	35	37	39	41	43	45	47	49	52	54	56	59	61	64	67
7½%	29	31	33	34	36	38	40	42	44	46	48	50	53	55	58	60	63	65	68	71	74
10 %	33	35	37	39	41	43	45	47	49	52	54	56	59	61	64	67	70	72	76	79	82
12½%	38	40	42	44	46	48	50	53	55	58	60	63	65	68	71	74	77	80	84	87	90
15 %	43	45	47	49	52	54	56	59	61	64	67	70	72	76	79	82	85	89	92	96	100
17½%	48	50	53	55	58	60	63	65	68	71	74	77	80	84	87	90	94	98	102	106	
20 %	54	56	59	61	64	67	70	72	76	79	82	85	89	92	96	100	104	108			
	Percentage of Mark-Up to Add to Cost of Labor and Materials																				

In the above table the percentages shown are the nearest whole numbers, omitting fractions

Reproduced by permission Association of Electragists, International.

PROBLEM—TABLE II.

An Electragist, desiring to know just how much construction work he had done during the past twelve months, received the following statement from his bookkeeper:

Total construction business completed and billed Aug. 21, 1926, to Aug. 31, 1927		$25,000
COST of MATERIAL for above business	$ 7,900	
COST of LABOR	8,200	
DIRECT JOB EXPENSE	150	
TOTAL PRIME COST		$16,250
OVERHEAD COSTS (Aug. 31, 1926, to Aug. 31, 1927)		6,250
Total COST of $25,000 business, Aug. 31, 1926, to Aug. 31, 1927		$22,500
NET Profit on Gross Sales		2,500
		$25,000

This Electragist is ready to bid on a small wiring job, and with the above information before him he sets about to arrive at a selling price which will include HIS overhead. His cost figures are given below.

		COMPLETE THE ESTIMATE
ESTIMATED COST of MATERIAL for this job	$ 51.00	
Estimated COST of LABOR	46.00	
DIRECT JOB EXPENSE	3.00	
TOTAL PRIME COST	$100.00	
PLUS —— per cent for OVERHEAD COSTS AND NET PROFIT (10 per cent of selling price)		
SELLING PRICE to customer must be		

But the fallacy of this reasoning is that overhead and profit are really proportions of **selling price**, which is as yet unknown, and not of prime cost. The method of finding the percentage which must be taken of prime cost in order really to get an overhead included which will be 25 per cent of the **selling price,** was then gone into in detail.

Figuring of overhead and the mark-up for profit is as nice a little trap to snare the unwary as the mathematics of accounting can conjure. Practically 95 out of every 100 of those taking this little problem in hand showed that their understanding of the system of marking up on prime cost of doing business was cheating them without their knowledge.

After the principal of finding the percentage to be added to prime cost to get overhead and profit on **selling cost** had been explained attention was directed to Table 1, at the bottom of the page, taken from the back of the Electragists' system job sheet. This, it was shown, contains a short cut in the figuring of overhead and profit.

The following explanation is given with the table:

Overhead is just as much a part of the cost of the job as are the materials and labor used.

The percentage of overhead is found by dividing the cost of doing business by the gross business done (total of all selling prices). The percentage of overhead is therefore a percentage of the **selling price.**

An estimate or record of a job shows only the cost of labor and material (prime cost). It is necessary therefore to find an amount to add to this prime cost which will give a selling price that includes your overhead percentage and the profit you desire.

This table shows the percentage of **prime cost** which must be added to the prime cost in order to find a selling price which will include overhead and the desired profit.

The following example is given:

Example

If your overhead is 22 per cent and you want 10 per cent profit—	
If cost of labor and materials is	$100.00
Add 47 per cent	47.00
Selling price	$147.00

Proof

Cost of labor and materials	$100.00
Overhead—22 per cent of $147	32.34
Profit—10 per cent of $147	14.70
Selling price	$147.04

Upon hearing of the results obtained from this problem during the last estimating series, as explained both at the Electragists' convention at Riverside and as given before the Pacific Coast Division of the Association of Electrical Supply Jobbers at its Del Monte convention, Harry L. Harper, manager, Graybar Electric Company, Los Angeles, and president of the jobbers' association, declared:

"The first need of the industry, it seems to me, is a simple and elementary course in arithmetic."

Just What Constitutes Overhead

When it was realized that the method of figuring overhead to prime costs was not properly understood, a realization came also that perhaps those items which go to make up overhead were not properly understood either and were therefore being ignored in figuring the overhead of doing business for the electrical contractor.

A card recently put out by the plumbers is interesting and very revealing on this point. The items found listed are: "office expense, office salaries, your own salary, auto expense, advertising, dues, interest on capital, interest on borrowed money, legal expenses, taxes of all kinds, donations, store expense, allowances for bad accounts, non-productive labor, insurance of all kinds, rent, light, heat, depreciation, damage to material, tools lost, broken or stolen, compensation, shop expense and 'cheerful estimating on jobs you do not get.'" The further declaration that "you pay for these items with your profit if you do not figure them into every job," leaves nothing untold.

Thorough examination into those things which constitute the cost of doing business and of the methods of keeping records of them so that the condition of the business can be seen at a glance at all times will constitute the major activity of the California Electragists during their January and February meetings throughout the state. Electrical contractors are not the only ones interested in this phase of the business. The jobbers are also interesting themselves and their jobber salesmen are pledged to notify all contractors in their territories of the dates of the meetings in order that the utmost publicity can be given to the meetings so that not one who is interested in bettering his business shall lack the opportunity to attend them and to gain valuable assistance from them.

Variations in Figures Submitted in Test Case

During the class held by the California Electragists in seventeen districts in northern California and seven districts in southern California, two problems were given to everyone atthending the class which was made up largely of contractors and jobber salesmen. For the first problem there was handed out a blue print of a typical five-room small residence. Ten minutes were given to figure the job and submit a bid.

The second problem is that given in the accompanying article, one to figure percentage of overhead and then to apply it to a job the prime cost of which was given as $100.

Following are some figures derived from these lessons, typical of almost every class. They are figures submitted at one of the classes. A comparison of the highest and lowest also is given.

	Problem A (Bid for five-room house.) Typical Bids Submitted	Problem B (Working out overhead percentage and applying it to $100 prime cost.) Per Cent Overhead	Selling Price
Total outlets 36			
Knob and tube—			
Lowest bid $ 55.25	$125.00	38	$149.50
Highest bid 165.00	99.00	25	154.00
Conduit—	91.25	38½	151.80
Lowest bid 83.50	82.60	25	137.50
Highest bid 127.00	92.80	27.7	140.47
	110.75	10	120.00
In the class the actual	85.00	25	154.00
cost, without overhead	115.30	27.8	161.00
or profit was analyzed to	105.00	22	156.16
run within a dollar or	82.50	40	154.00
so of $75, knob and tube.	125.00	5	130.00
	94.00	10	130.00

Three out of five Red Seal homes recently wired at San Luis Obispo by Clines Electric Shop. Each uses range and electric heat.

Smaller Communities Show Rapid Advance Electrically

Red Seal Homes Numerous and Electric Heat Finding Many Applications in California Schools, Hotels, Hospitals and Industries

LEST the electrical industry should become discouraged in general with the more obvious development of home and commercial electrification, two healthy indications are apparent to a traveler interested in things electrical touring almost any of the communities of California outside of the larger cities.

These two indications are: first, that the Red Seal home idea is beginning to root itself into the ground and that results may soon be expected. Second, that the use of electric heat is very much on the increase. Its special adaptability to certain classes of installation has been discovered.

While a full report of Red Seal progress will be published in the next issue of Electrical West some of the more obvious and outstanding developments in the Red Seal idea will not be amiss.

San Luis Obispo, despite the competion of cheap natural gas, is rapidly becoming a Red Seal community. No small part of this condition can be credited to Archie Cline, energetic and tireless proprietor of the electric store bearing his name. In the past few months he has completed a half dozen Red Seal homes, notable among which are those of F. A. Butler, the Perira home and the home of J. H. Defosset. The latter with its two bathrooms

Santa Maria hospital electrically heated.

equipped with electric heaters, plugs for heaters throughout the house, a built-in Standard range and a built-in Kelvinator, pulls a 200-amp. load. Each of the jobs is well executed and despite the lack of inspection in San Luis Obispo, sets a high standard for electric installation.

Red Seal homes one, two or three in number are being built or have been built during the past year and others are in prospect in practically every community at the present time.

Electric Heating in Hotels and Schools

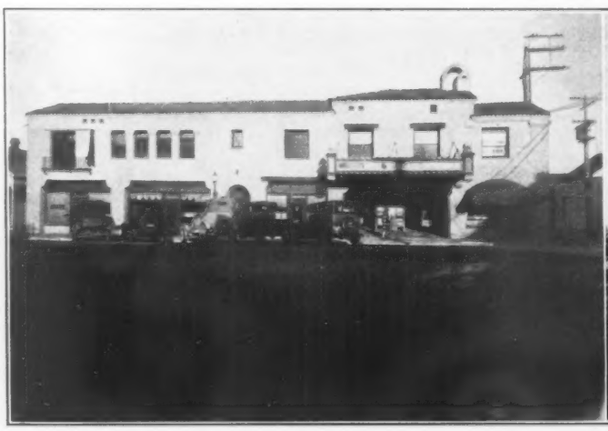
It is to electric heating, especially in roadside travelers' hotels, hospitals and schools that greatest strides are being measured.

At Salinas the new Santa Lucia Inn on the highway, a bungalow court type of travelers' hotel, where the motorist is offered a garage for his car, an electrically heated room or suite of rooms, and service from a central building containing restaurant, attractive lounge, and reading room, electric heat plays a very important part. This installation was made by the Salinas Electric Works and is particularly complete. The service is brought in underground to a transformer enclosure feeding a main switchboard panel in the toolhouse behind the garages. Individual panels in each cottage give control of the electric heaters for that cottage. Each room heater is supplied with a switch which is turned on as the room is rented for the night to tourists. Such an installation saves the cost of an expensive steam heating plant and is economical in that only such heat as necessary is used.

Plans are being made to equip each of the cottages with an electric water heater also. The restaurant has electrical waffle irons and toaster, and an electrical laundry serves the institution.

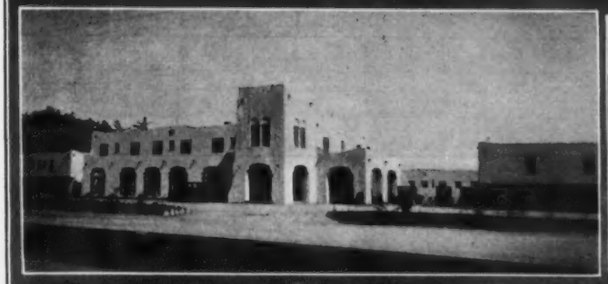
The Santa Lucia Inn has 191 kw. of connected load and expects to place 30 more kw. in water heating within the next few months.

Since lighting makes such a place at-

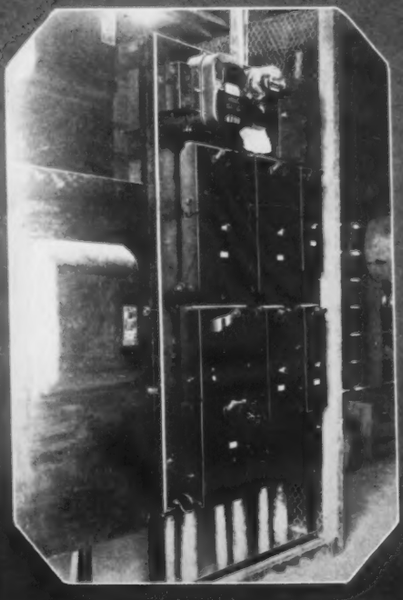


Electrically heated office building and theater, Lompoc.

Additions to Lompoc high school will also have electric heat.



ESPECIALLY suitable to the highway hostelry is electric heat, which can be turned on as desired. (1) and (2) the Santa Lucia Inn, Salinas, a bungalow-court type of hotel. (3) Interior of a suite. (4) The lounge electrically heated. (5) Transformer enclosure serving the hotel, and (6) its main switchboard.



Electric homes, Red Seal and otherwise, well equipped, wired in Coronado recently by J. F. Zweiner, Electragist of San Diego.

tractive, the lighting has been very well handled in this instance. The Neon sign is used on the highway and floodlights advertise the place to the passing motorist. The grounds and buildings are also decoratively lighted.

In passing it may be said that W. D. Evans, proprietor of the Salinas Electric Works, is building himself a new home which will be the last word in complete electric home equipment, including a burglar light system and many novel personal applications of electricity in the way of lighting and equipment.

A hotel similar to that at Salinas has recently been built at Morro Bay. It has 150 kw. in air heaters, ranges and water heaters.

Several small community hospitals, notably the one at Santa Maria, are utilizing electric heat to good advantage. The Santa Maria Hospital has 100 kw. in air heating.

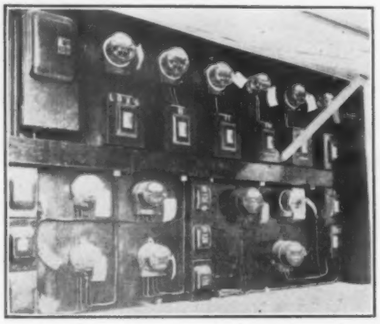
Several schools are being equipped with electric heaters, many of them having found that such heating is an advantage, since individual rooms can be heated as needed and the services of a fireman for maintaining a heating system is found unnecessary.

Among the electrically heated schools are one at Castroville with 193 kw. in electric heating, the Cambria High School at Cambria, Calif., 50 miles north of San Luis Obispo, installed by Clines, and the Lompoc school in which W. E. Rohrer, proprietor of the Valley Electrical Company, of Lompoc, has put in a good installation; 120 kw. in electric heat will be the total installation at the new high school. Mr. Rohrer has also installed 90 kw. of heating in a new office building and 70 kw. in a motion picture theater in Lompoc.

A new school at Carrega, where electric heat was first tried in the kindergarten, not only has electric heating throughout but has a number of electric ranges for domestic science classes. The school at Los Olivas is also electrically heated.

An All-Electric Town

A little roadside town called Buelton is rapidly becoming known as an all-electric town. Such a reputation started from the electrical cafe located there, which has recently been matched by several others until now all of the cafes are electrically equipped and quite completely. A camp having 30 cabins furnished with electric heat and electric ranges for cooking is also credited to the town and a hotel and theater likewise.



Workmanlike individual control for office building at San Luis Obispo made by Clines. Lack of inspection is not taken advantage of here.

Several industrial installations made recently are interesting also. Enlargement of the ice plant of a large company furnishing ice to vegetable refrigerator cars sent out of the Salinas Valley occasioned the addition of considerable electrical equipment to that plant. The Salinas Electric Works made the instalation.

A mile of line has recently been built to bring electric power to a new oil field being prospected near Buelton. The new field is using electricity not only for drilling but for all operations in connection with the oil field. Savings of from $60 to $75 per day on fuel are claimed for the electric installation as against burning oil for power on the grounds.

The Celite workings near Lompoc where gypsum is being mined and prepared for shipment has one of the largest electrical installations for an inland industrial plant of this nature.

New canneries and packing plants are numerous, each taking advantage of the available electric power to develop industry near the base of supply of raw materials.

The California Packing Corporation's fish canneries in the Monterey Bay district are notable installations of this kind. Several of them have been rewired completely and the lighting improved recently by the Tice Electric Shop of Monterey.

A silk plant where silk worms are to be cared for and cutivated is being built near Escondido. A large electric load for heating is expected in connection with this installation in order to maintain accurate temperature for the silk worms.

Another interesting application of electric heat comes from National City, Calif., where a nursery uses a number of strip heaters placed under trays of earth in a greenhouse in which seedling palms are being grown for market. The electric strip heaters have been found to be more economical than a steam plant in this instance.

A well laid out electrical installation at the Salinas ice plant.

Home Rewiring Drawing Attention.—A recent issue of "Printers' Ink" contains an article, "The Advertising Opportunity of the Home Replacement Market." It gives considerable space to descriptions of home rewiring programs now under way. The refixturing and rewiring programs fostered by electrical leagues and the Society for Electrical Development are described and it is pointed out that with the decreasing new building at the present time the future market for building material of all kinds will be in the development of modernizing already existing residences in all parts of the country. The article in the Nov. 3 issue describes effort being made to interest building and loan companies to make loans for rebuilding and modernizing of old homes.

"Safety Circuits"—What They Are and How Used

Because Merely a "Ground" Does Not Give Complete Protection, Fire and Life Hazards Dictate More Adequate Methods

By S. W. BORDEN*, Grounding Engineer, Crouse-Hinds Company

THE TERM "safety circuit" is used to designate an electrical circuit which is intended primarily for protection against the hazard of electrical shock. The terms ground, ground circuits, ground conductor, etc., have been used rather loosely in the past, not only for safety circuits but for a great variety of other earth connections as well, including accidental and incidental grounds as well as a considerable variety of earth circuits which are used for other than safety purposes.

In this latter class are the power grounds used in generating and substations for grounding the neutrals of the transmission system, lightning arrester ground connections, electrical railway negative return systems, earth return circuits for telephone, telegraph and other communication and signaling systems, railroad block signal systems, wireless equipment, etc.

The insulation breaks down on a motor winding and we call it a "ground," and we drive a rod into the ground and we call it a "ground." Some repair men have a rule something like this: "If you find a lighting circuit which is grounded, reverse the leads. This will put the ground on the grounded side and eliminate the ground."

As the interest in matters pertaining to grounding has increased it has become more and more apparent that some distinction should be made in terminology between those circuits which are used primarily for safety purposes and the various other types of earth circuits and grounds, and the term "safety circuit" has been suggested as a practical and appropriate designation. It includes not only the circuits used for grounding at the main switch on the customer's premises but properly includes circuits for grounding all equipment such as motor frames, hand lamps, portable tools and appliances, etc., as well as protective grounds for fire alarm and police boxes, etc.

The Code Is Being Changed

During the past four of five years there has been an awakened interest in this problem. One contributing factor is the fact that the National Electrical Code, now that it has become an item in the American Engineering Standards, is undergoing a fundamental change in character and is being made over into an all-hazard code as it can no longer be merely a fire underwriter's code. This means, of course, that it must provide for proper construction to take care of the shock hazard as well as the fire hazard.

* From a talk given at the Salt Lake City convention of the International Association of Municipal Electricians, Aug. 16, 1927.

"The low-voltage hazard, as well as the high-tension hazard, undoubtedly are serious ones, and there seems to be no doubt but that people have been killed from 110-volt shocks, but the difficulty cannot be overcome by leaving the circuit ungrounded. In the first place it leaves no protection against the high-tension hazard and in the second place the circuit as a rule cannot be kept clear of accidental grounds, and a cricuit which is accidentally grounded is even more dangerous than one which is intentionally and properly grounded. The solution of the low-voltage hazard is polarized wiring with safety circuits for the frames and metal enclosures of all stationary and portable motors, tools and other utilization equipment."

The grounding section of the code has been considerably strengthened in the last two revisions. The activities of the labor and industrial boards also have had their influence, but perhaps the strongest influence has been that of the electrical codes of some of our large cities. These codes are, naturally, all-hazard codes since the municipality is at least as much, if perhaps not more, concerned with the shock hazard than with the fire hazard and some of the code work which has been done is certainly setting a pretty stiff pace for the National Electrical Code. The new Canadian code also probably will be an outstanding example of this class of code work.

General Safety Circuit Requirements

The safety circuit, for the ordinary lighting installation, should have the following characteristics:

1. It should create no fire hazard.
2. The connection should be such that when a burnout occurs, due to one of the ungrounded service wires coming in contact with the service entrance conduit, the ground connection for the conduit itself will not be injured.
3. The circuit should provide a proper path for both high and low frequency currents and also for direct current.
4. The circuit should have as low resistance and as high carrying capacity as a reasonable cost will permit.
5. It should be fully protected against mechanical injury.
6. All connections should be at least as good as those employed for other electrical circuits and must have ample carrying capacity.
7. The construction should be such that its application need not be limited to any particular locality or conditions.
8. The construction should conform to the requirements of the National Electrical Code.

The safety circuit shown in Fig. 1 embodies all of the foregoing features, the merits of which may be summarized as follows:

1. In case one of the underground service wires becomes grounded on the service entrance conduit the resulting short circuit current is confined within the switch box itself and therefore creates no fire hazard. An open ground wire may be a serious fire hazard.
2. If the resulting short circuit destroys the conductor or connections through which it passes, the ground connections for the switch box and conduits still remain intact so that the protection against the high-voltage hazard is not destroyed by a short circuit of the service conductors.
3. Two paths to ground are provided, one of which (the conduit) will readily drain off high-frequency disturbances while the copper conductor, together with the conduit, will have sufficient capacity to throw out the primary fuses or circuit breakers or even a trolley circuit breaker set for 3,500 amp. No other combination of ½-in. conduit and No. 8 wire will do this, and trolley crosses are generally more or less disastrous where other systems are used.
4. Having two conductors in multiple there is 100 per cent safety factor since either conductor alone will afford a very substantial amount of protection. For the materials used it gives the highest possible carrying capacity and the lowest possible resistance.
5. The ground clamp and ground wire are properly protected from mechanical injury as required by the National Electrical Code. Sec. 905 D. (1925 edition.)
6. No dependence is placed upon the locknut-bushing-box type of contact as these are unreliable and even under the best of conditions will usually burn clear of the box on less than 1,000 amp. which is not very much for a short circuit ahead of the fuses.
7. The system is suitable generally for standardization and it may properly be used where artificial grounds are employed as well as where water piping is available. With the system built up according to these specifications even a poor artificial ground will afford considerable protection against the life hazard while the fire hazard is well taken care of.
8. There is no question as to conformity with the 1925 edition, National Electrical Code, while this can not be said of many of the circuits being installed today.

There are at present in use about 150,000 safety circuits which conform to the type shown, at least to the extent of employing a conduit-type ground fitting, grounding bushings and conduit protection all the way from the box to the water pipe. They are widely distributed over the United States and Canada, thus demonstrating the universal applicability of the plan so far as territorial requirements are concerned.

Point of Connection to Water Pipe

The tendency in the past has been to require ground connections to be made on the street side of the water meter, but the trend at the present time is an increasing tendency to permit the connection to be made on the house side of the water meter, particularly where a rather long or expensive run is necessary to get to the street side.

In a large percentage of our grounding installations of today, if the regulations permitted the grounding conductor to be attached to the water pipe at the

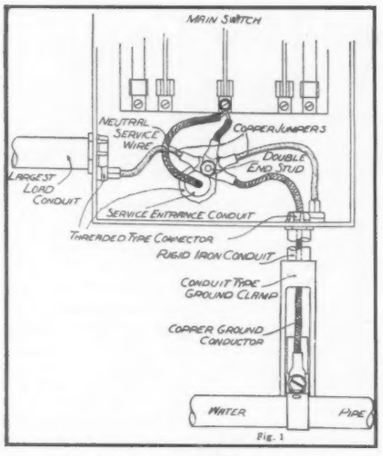


Fig. 1—A typical safety circuit.

most convenient location, and at the same time required that grounding conductor to be placed in conduit and made up with proper fiittings, we would have a grounding job which would not only be adequate and commendable but we would be getting a better job at a lower cost.

In other words, the requirement of connecting outside the meter often involves a very considerable expense and one which is out of proportion to the advantage secured, whereas, for the sake of saving a very much smaller amount, methods which are generally inadequate and unsatisfactory otherwise, are being permitted. For runs exceeding say 20 ft., the requirement seems to be unjustifiable and, considering the present grounding practice, inconsistent. It is, in fact, questionable if the practice is sound, irrespective of the length of the run.

Frequently the mechanical conditions on the street side of the meter are such that the ground clamp is not, and in many cases cannot be, properly installed. On the other hand, if the wireman is permitted to select his own location he will pick out one where he can do his work properly and conveniently and may very consistently be required to choose a location which is accessible readily and visible for inspection.

As between the two methods, in a great many cases, we are simply confronted with the problem of having a thoroughly good ground connection on the house side of the water meter or a comparatively poor one on the street side of the meter. So far as the use of the interior water piping as a ground conductor is concerned, it is entirely adequate mechanically and electrically and far superior to most ground circuits of today. With the connection on the house side of the water meter a very much shorter ground circuit is installed at the customer's expense and this fact, to a considerable extent, makes it feasible to require this circuit to be brought up to a high standard of construction without increasing the total cost to the customer as compared with present methods.

The following regulations are suggested for your consideration:

Ordinarily the ground connection to the water piping shall be made on the street side of the water meter, but when conditions are such that this point is not readily accessible and in plain sight, or the mechanical conditions are such as to interfere with securing an entirely adequate contact, the connection *must* be made on the house side of the water meter, and in any case the connection *may* be made on the house side of the water meter.

When the connection is made on the house side of the water meter it must be made to the permanent cold water piping system and to a pipe not smaller in size than the conduit size necessary to take the ground wire. The water meter and any part of the water system which, from its nature, is removable shall be bonded by means of a water-meter shunt, especially approved for the purpose.

Meter shunts should be installed so as not to interfere with the removal, testing or reading of the meter. The connections should be made outside of all valves and should never be made to the brass meter spuds as this interferes with the removal of the meter. An approved shunt, properly installed, is shown in Fig. 2.

There is perhaps no more imperative duty devolving upon the municipal electrical inspector than that of seeing that electricity is made safe for the public. He is fully justified in putting upon Sec. 9 of the National Electrical Code the most rigid interpretation possible and if that is done there is no necessity of looking any further for ample justification for adequate safety circuit construction. He should obtain easily the fullest co-operation from the public utilities and the fire underwriters while the man who pays the dollar or two of extra cost, if there is any, receives many times his money's worth. If present conditions are not what they should be does not the inspector owe it to himself to make sure that he is not simply suffering from an inferiority complex where safety circuit construction is concerned?

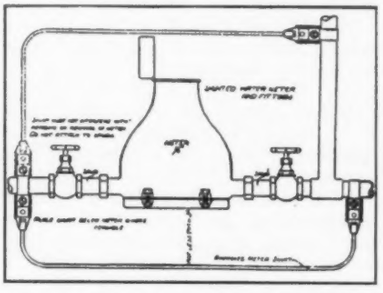


Fig. 2—Meter shunt properly installed.

Estimating Ventilation for Restaurants and Stores

By J. R. Wilson*, Quality Electric Works, Los Angeles

Electrical Estimating Series—XXXI

AS PREVIOUSLY stated, disk and propeller fans are unlike the centrifugal fan with reference to general performance. In general they should not be used for handling air through long runs of piping or against any appreciable resistance. For exhausting air from a room or handling large volumes of air against little resistance they are more efficient than a centrifugal fan used for the same purpose but if the resistance is more than ¼ in. the propeller fan becomes less efficient and a centrifugal fan, in most cases at least, should be used. The more air a disk or propeller fan handles at a given speed the less the power required to operate it. With the centrifugal fan the opposite is true. For that reason as little resistance as possible should be offered to the air passing through a propeller fan.

Where it becomes necessary to install propeller fans with short lengths of pipe, the duct length should not exceed a maximum of 30 ft. and the duct should never be smaller in diameter than the opening in the fan. In fact it should always be larger if structural conditions permit. Fig. 5 and Fig. 6 show the right and wrong methods of installing a propeller fan in connection with duct work. In Fig. 5, at "A," is shown the point at which the greatest amount of friction occurs. If the diameter of the duct is reduced below the diameter of the fan the friction is increased, thereby overloading the motor. Where this condition occurs, the amount of air that is exhausted is greatly reduced, resulting in an unsatisfactory job of ventilation.

In Fig. 6 the size of the duct is shown increased beyond the size of fan, and a flare provided at the fan opening. This is the proper method of using propeller fans on duct work, and should be strictly adhered to if satisfactory results are to be realized. This method reduces the friction to the minimum and allows the fan to handle the amount of air for which it is designed with very slight reduction due to duct resistance. In some instances it is absolutely necessary to use a right-angle bend in connection with duct work, both on propeller and centrifugal fans. Where this condition occurs great care must be taken in designing the elbows to be used. This is especially so in the case of propeller fans.

In Fig. 3 and 4 are shown right and wrong designs of right-angle bends to be used. The bend should never be an abrupt right-angle as shown in Fig. 3,

* All rights reserved by the author.

that is with square corners. This type of bend offers six times as much resistance to the passage of air as does the design shown in Fig. 4. All bends should be designed with as round and graceful a contour as the building con-

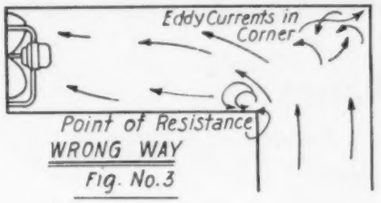


Fig. No. 3

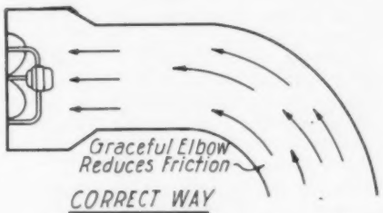


Fig. No. 4

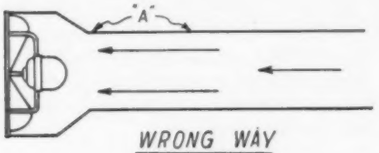


Fig. No. 5

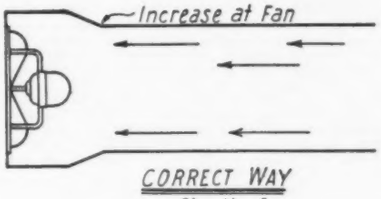
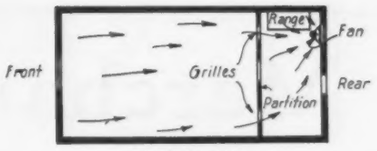


Fig. No. 6

Fig. No. 7 - Side View

Fig. No. 8 - Side View



CORRECT WAY
Fig. No. 9 - Plan View

WRONG WAY
Fig. No. 10 - Plan View

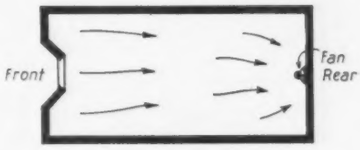


Fig. No. 11 - Plan View

ditions permit. Otherwise the efficiency of the ventilating system will be greatly reduced. Another bad practice, sometimes followed through ignorance of the fundamental laws of ventilation, is shown in Fig. 7. Here we have a propeller fan installed in connection with duct work of cramped dimensions containing less area than that of the fan.

In Fig. 7 can be noted how the propeller fan works against a very strong back pressure. This is shown at point "A" where a considerable eddying of air is caused, resulting in a very definite choking effect. This effect may be likened to trying to push a one-inch rope through a three-quarter-inch hole. The motor becomes greatly overloaded and may eventually become burned out. Where it is necessary to blow air through ducts to the outside the correct method is shown in Fig. 8. It will be noted that the duct is slightly larger than the fan diameter and the bend is of such contour as to allow the air to flow around it freely, with the minimum of restriction. Sometimes a vertical duct or chimney is already installed in a building, and it is desired to make use of this duct as an outlet for the fan.

If this duct is on the inside of the building, where the air therein is protected from outside chill, there will be a natural "stack" or "flue" effect in the duct. If the duct is on the outside of the building, cold air strikes the surface of the duct, chilling the air therein. The air being chilled, it has a tendency to become heavy so that a greater pressure is required to overcome the effect of this chilled air. This is another cause of fans becoming overloaded. As stated before, blowers should always be used with large duct systems. In Table A (Electrical West, Dec. 1, 1927) were given the rates of air change for buildings used for certain specified purposes. In the following paragraphs some further consideration will be given to specified types of occupancy.

Kitchens

In no other building is ventilation more necessary than in the hotel or restaurant kitchen. If the odors of cooking food are allowed to enter the dining room the result is discomfort to the customer, and loss of patronage. An air change each two to three minutes will give excellent results. When installing a ventilating fan (or fans) in a hotel or restaurant kitchen great care should be taken in selecting the location for the fan. In Fig. 9 is shown the correct way to make the installation. The fans should always be placed above or as near the range as possible, but not so that the chef will stand in a draft.

Where possible install the fan in the upper part of a window in the rear wall and allow the fresh air to enter the front of the dining room either through the transoms or some other opening. In this way all heat and odors are removed before they can circulate elsewhere.

(To be continued.)

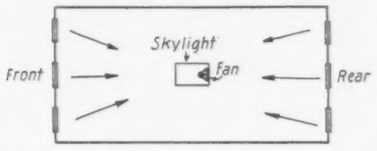


Fig. No. 12 - Plan View

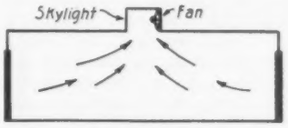


Fig. No. 13 - Side View

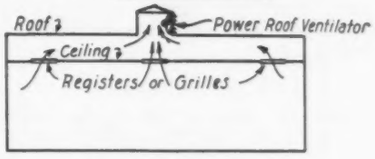


Fig. No. 14 - Side View

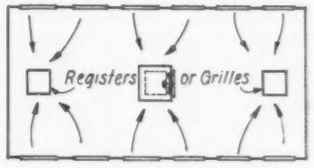


Fig. No. 15 - Plan View

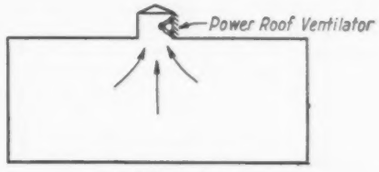


Fig. No. 16 - Side View

Better Merchandising

New Business Along Old Lines

It's No So Much How Saturated the Appliance Market Is in a Locality as it Is the Development of Greater Use in the Same Field

ALONG with the inventory of stock, customary around Jan. 1, a mental inventory of selling methods, ideas and plans is not only prudent, it is imperative, if the electrical merchandiser is to remain among the ranks of those who have survived when next year's inventory of business is taken.

A presidential year need scare no merchant out of a year's growth if he drives for a definite goal and keeps to the track. The tendency to slump in effort and advertising, like a sailor reefing down his sails in the face of a squal, is as out of date as the sailing schooner itself. The modern sailor screws down the hatches a little tighter, stokes up the boilers and settles down for a stiff fight with conditions which he knows he will master if he sticks to the ship.

As long as the public, fascinated by every new gadget announced for doing something electrically, bought without being asked—in fact demanded electrical appliances before they were put on the market sometimes—smooth seas prevailed for the electrical merchant. Competition, however, is coming from every other merchant, these days. The more cosmetics milady buys for instance, the less money she will have for waffle irons.

The Selling Inventory

Granting that electrical appliances must now be **sold** in competition with cosmetics, new flivvers, parlor suites and kollege kut klothes, what's to be done about it? Just what is a sales inventory, anyway?

Before a power plant is built surveys and plans are made. Before a military campaign is launched "intelligence" as to the enemy's fortifications, numbers, equipment and other factors of strength or weakness are examined and plans laid accordingly. Even the wily football coach appraises the style of play and general technique of an opposing team before a crucial game.

Merchandising is no different. To be successful it must be planned. To show profits where red ink grew before when the books are closed Dec. 31, 1928, the selling possibilties of a dealer's store must be surveyed. The field must be understood and a campaign to turn that field into an electrically equipped community must be laid down carefully and soundly.

Haphazard selling brings only haphazard jingling of the cash register.

COMPETITION has narrowed itself down to a struggle between industries for the "consumer's dollar." Unless the electrical merchant shows good reason for electrical purchases instead of purchases of other home equipment, or even trinkets, the big share of that "dollar" will go elsewhere. It is time for some New Year resolutions on more ingenious and more profitable selling.

Analyzing Service From the Buyer's Viewpoint

No sales quotas pinch the financial stomach of the average electrical contractor-dealer. He has his hands full, literally speaking, attending to business that comes to him in one form or another. He follows an established routine, possibly advertises once a week or twice a month, but really hasn't time to study and analyze his business from the ground up. If business comes to him, well and good. If it stays away—well, that's different again.

The trouble is that too few electrical contractor-dealers realize that a lot of business is not coming their way—that it stays away. But when enough business stays away to make sales slump alarmingly and sales volume decrease perceptibly, then it is time to jump.

No business man should ever be too busy to take time off to study his business a bit. No electrical merchant is too busy to be able to get down to brass tacks now and then, to get out and get under his business, looking for trouble. The wise electrical dealer knows only too well that "business volume spells business profit."

A certain Western electrical contractor-dealer whose name obviously cannot be given is never too busy to take stock of where he stands, to find out if he is really making as much money as he ought to be making, to see if he is getting as much business as ought to be coming his way under the law of averages, whether old timers are coming back with their accustomed frequency, whether they are recommending new customers, and finally, whether he is not really losing ground to his nearest competitor, and if so, why?

To test out what his customers thought of his electrical work and merchandise he recently spent a little money—a snug little sum—but he found out what he wanted to know.

He prepared a two-fold circular, which he sent to everybody to whom he had ever sold electrical work and merchandise, and whose name was still listed in the city directory or in the telephone book, and on the front of this circular was the single question:

How is our Service?

Naturally they opened up the folder to find out what it was all about, and so read this message:

To My Friends and Customers:

We are trying in every way to give you good, painstaking service, plus quality merchandise reasonably priced, and there is no feature in our service which does not receive our undivided personal attention. But the final test of our performance is **how do YOU feel about it?**

Won't you please tell us whether the electrical work and merchandise which you bought here were in all respects satisfactory? Whether you were pleased with your purchase? Whether you got satisfactory use out of it? Or if you experienced any trouble of any kind, be sure to tell us that. Whether your wants and your requests have always been promptly attended to, and on scheduled time? Whether you have received uniformly courteous treatment? If not, I want to know all about it.

Won't you tell us whether we are living up to our slogan of SERVICE WITH A SMILE?

Can you think of anything we failed to do which ought to have been done? Did we fail in any way? How can we improve our service and make it better for everybody concerned?

On the next page we have printed some questions. Won't you please fill in your answers, detach and return this questionnaire to us in the enclosed envelope?

Your co-operation will be greatly appreciated and may be the means of bringing about a real improvement in our service to others. It may bring to light something about which we are now completely in darkness. We want to do what is right—so won't you please help us in this predicament, by giving us a real inside knowledge of what our customers think about us?

Thank you!

On the next page was the questionnaire, with this heading:

IN NOTING UNSATISFACTORY CONDITIONS

Kindly Give Details, if Possible

1. Are your purchases here giving satisfactory service?
2. Have you found any defect which you did not report to us?
3. Did you get prompt and immediate attention when you came here?
4. Did you get uniformly courteous treatment?
5. Did you always buy what you wanted to get? If not, what happened to make you change your mind?
6. Did you ever call for anything that we did not carry? What?

7. When you call on the telephone do you get satisfactory answers or do you consider them discourteous or unbusinesslike.?
8. Are your bills understandable and accurate?
9. Have you any complaints of any kind?
10. Have complaints been satisfactorily adjusted?
11. Would you buy from us again if you were in the market?
12. Have you any suggestions to improve our service? To better our store arrangement—to improve our display methods?
13. What types of electrical work and merchandise do you buy here most frequently?
14. What other lines do you suggest we carry to improve our service to the public generally?

Name .....
Address .....

On the last page of the circular was a space for general comments, with the heading:

OTHER MATTERS THAT WE OUGHT TO KNOW ABOUT

Will You Kindly Add a Few Words of General Comment Here?

The rest of this page was blank to accommodate such comments.

The questionnaires were mailed to customers on a staggered plan, not all at one time, and as was to be expected, replies started coming in shortly after the questionnaires reached the customers, and every day for several weeks they continued to pile in.

Each customer returning the questionnaire received a postcard acknowledgment of thanks. Complaints were investigated immediately, and, if possible, disposed of at once to the entire satisfaction of the customer. Many of those who complained did not say just what the difficulty seemed to be, and the next step was to find out what the trouble was in order that it might be remedied.

Incoming letters and questionnaires were placed in two general groups, commendatory and otherwise. Unless the letter was an unqualified commendation, the rule was to class it as "otherwise." In every case diligent effort was made to show that the electrical contractor-dealer was sincere in his efforts to improve his service, and not merely fishing for compliments.

Results from this questionnaire sent out to all customers, active and inactive, were summed up in another circular which was sent out two months later, entitled:

The Proof of the Pudding

and on the inside of the circular, this message:

Last month we enclosed question blanks on which our customers were invited to tell us what they thought about our service.

We did this because the true test of our desire to serve you 100 per cent efficiently is not how we feel about it, but how **you,** the customer, feel about it.

The proof of the pudding is in the eating. So far some 1,500 customers have replied, and we appreciate their co-operation. We wish that the number of replies had been larger, but we know how easy it is to overlook printed matter of this type. So we enclose another copy of our original circular. If you are one who has experienced any serious trouble and have failed to tell us about it, please do so now.

The large majority of those replying, to be exact 73 per cent, found no fault with our electrical work and merchandise or our service. In fact, many said kind things about us. The remainder covered a wide variety of comments, questions and criticisms, and to these we have been giving the most careful thought and attention.

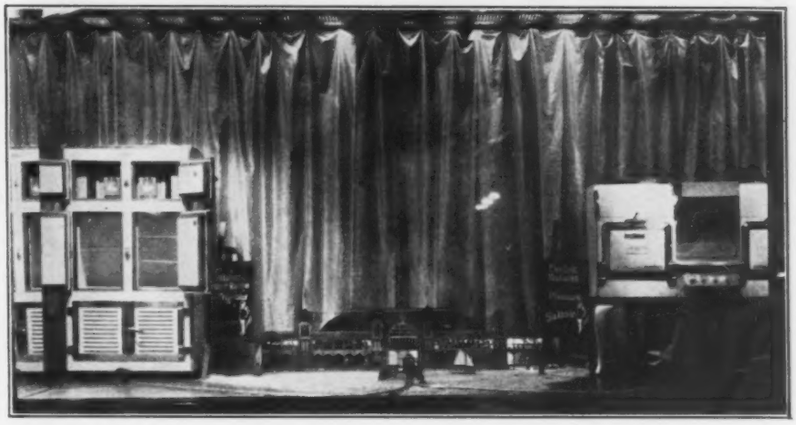
We have been able to correct a number of difficulties experienced by some customers, and our attention has been directed to ways and means by which improvements could be made in dealing with the public generally.

Finally, there have been many opportunities through this personal contact for us to straighten out difficulties and problems for customers which might otherwise never have come to light. This will make for better understanding in the future.

It is our business to serve and please you, and you can help us by telling us when you think we have failed. That's what we want to know—always!

As a result of this service-analysis questionnaire this electrical contractor-dealer got an earful and quite a few eye-openers as well. It also gave him a pretty good cross-section perspective of his business relations with the public from all conceivable angles, and the percentage of replies was enough to gage the law of averages. Furthermore, it resulted in increased business from his old customers, which after all is what any establishment must have to **remain** in business.

Resort Featured in Window Display



An attractive window display, used recently by the Utah Power & Light Company, in Salt Lake City, featuring the famous Saltair resort, located a few miles west of the city, on the Great Salt Lake. This pavilion, which was destroyed by fire about two years ago, has been completely rebuilt, on a larger and more elaborate scale than before, and is equipped electrically throughout. The miniature reproduction of the pavilion, displayed in the window, was remarkable in its exactness as a replica of the famous resort.

Demonstration Cottage on Boardwalk Attracts

In an attractive little cottage on the boardwalk at Santa Cruz the Coast Counties Gas & Electric Company maintains an exhibit of gas and electric appliances which is on display continuously. The exhibit is housed in a small building of the bungalow type, making an appropriate setting for the exhibit of gas and electric appliances for better homes as stated on the sign surmounting the house.

In the path of thousands of people at the beach resort the exhibit attracts considerable attention and has many visitors. It gives the power company an opportunity to explain the advantages of electrical appliances to customers and to visitors and a great many sales are made as a result of the display.

New Lighting Bulletins on Stores and Signs

Two lighting data bulletins have been issued recently by the Edison Lamp Works of the General Electric Company from the general sales office at Harrison, N. J. The first is "Lighting for the Modern Store"; the second, "Electric Sign, Poster Panel and Bulletin Lighting." The store lighting manual was compiled by A. L. Powell of the Engineering Department and that on signs by E. B. Fox of the same department.

The pamphlet on store lighting is divided into departments dealing with large dry goods or department stores, distinctive shops, and neighborhood or small stores. The show window is also given consideration. Illustrations are profuse and the pamphlet contains much valuable working data.

The electric sign manual takes up in detail the uses for signs, their types and design and provisions of the National Electrical Code regarding sign installation. Like the modern store booklet, this pamphlet is profusely illustrated and contains a great deal of working data.

Similar data pamphlets to be used in selling lighting are made available by other lamp manufacturers from time to time.

An example of outlining with neon tubes. The arches as well as the sign are illuminated with neon lighting.

Neon Lighting Adaptable to Many Advertising Uses

Building and Architectural Detail Outlining Added to Applications of Brightly Hued Luminous Tubes Now Used Extensively for Signs

By JOHN W. HARRIS, General Manager, Electrical Products Corporation.

THE POSSIBILITY of using neon, which is one of the rare gases of the air, in the field of electrical advertising and also possibly in the field of general illumination, was first developed by Georges Claude, of Paris, France, well known physicist and a pioneer in the development of liquid air. After some years of investigation he found that neon properly purified and inserted in glass tubes under certain pressure and made active by the use of electricity produces the very characteristic orange light which has excited so much favorable comment.

Mr. Claude found further that by introducing in the vacuum tube containing neon a few drops of mercury the blue light, also characteristic of this form of lighting, could be produced. At the present time Mr. Claude is conducting further experiments in the expectation of producing other colors, white included, and there is a strong possibility that neon in some form, as manufactured under the Claude process, will enter the field of general illumination.

Patents in France were issued to Mr. Claude just prior to the war, but the development of neon in France naturally was retarded by the war and it has only been since the declaration of peace that the production of neon has really begun to develop on a commercial basis. Patents were issued in England to Mr. Claude and also in the United States at various times from January, 1915, to June, 1917. In all, five patents have been issued covering the various processes in the creation of the vacuum of the tubes, the purification of neon, the type, size and construction of electrodes which carry the electricity into the tubes, and also covering various other features. The American patents were assigned by Claude to Claude Neon Lights, Inc., New York City, who have, in turn, assigned the right to manufacture under the Claude process in twelve Western states to the Electrical Products Corporation of Los Angeles, San Francisco and Oakland.

Longer effective use of the neon sign, even during daytime hours, has stimulated the electric sign market as never before in history, so that all forms of electric signs have benefited from the introduction of neon.

The consumption of electrical energy is very small. The candlepower per watt, however, is almost double that of the electric lamp, giving 2 cp. per watt. As compared with electric signs using 25-watt lamps, the current consumed by a neon sign of equal size is approximately one-sixth. Neon has been described as monochromatic lighting for it has none of the vari-colored rays typical of the incandescent lamp.

It has an extremely high power of penetration through the fog. For this reason it has been adopted by the British government for the purpose of lighting the tower of the Croyden airplane field near London, making it possible even in foggy weather for the pilots accurately to locate the field. The Electrical Products Corporation of Oakland has installed Claure neon tubes for experimental purposes on the Ferry Building in San Francisco, the ultimate purpose being the use of these tubes on

boats in the expectation that the danger of collisions in fog largely will be eliminated.

It has been used more recently by one of the large studios in Los Angeles in the filming of color motion pictures. At the present the widest field for the neon is in electrical advertising and it has been adopted by a number of large concerns, many using it as standard electrical outdoor advertising.

The tubes are practically cold and generate no heat. If properly manufactured the tube should last from 2,000 to 4,000 hours.

By making a tube of amber glass the mercury-neon or blue light is changed to a brilliant green. Varying shades of orange-red, blue and green now are being produced successfully and may be seen in profusion on the streets of the larger cities of the Pacific Coast.

The penetrative qualities of the light, due to the monocromatic character of the light itself, make the neon sign applicable to daylight as well as night use. Unless the sun is bright on the surface of the sign itself the color stands out distinctly even in daylight. The fact that the cost of operation is low also encourages this daytime as well as night use of the sign and provides the central station with a longer and more equable load than the average sign.

Following the successful and widespread use of neon lighting in advertising signs has come an increasing development of its use in outline decoration of store fronts, architectural details and of buildings themselves. The continuous line produced by the luminous glass tube lends itself naturally to this form of decoration. A very pleasing effect, for instance, is achieved in the color cap on the Carthay Circle Theater, Los Angeles, where a basket weave of neon tubes is placed over the topmost dome of the tower.

The manufacture of neon signs is largely a glass blower job and requires accurate and painstaking work. Designs are made by the artist and enlarged to the actual size of the sign on sheets of asbestos, to be used by the glass blower in shaping his glass tubing to the required shape. The tubes are blown in lengths approximately 10 ft. long apiece, a number of these lengths being necessary sometimes for the completion of a large letter or ornament. Where portions of the tube are to be blocked off, as for isolating the dot on an "i," the tube is covered with black paint which excludes the light.

The tubes are served from transformers usually encased in the sheet metal of the sign and carefully grounded and insulated. Although the neon tube is dependent upon a high voltage (10,000 volts) the amperage is only 27 miliamps. Special transformers have been designed for use with this type of equipment.

Increasing uses of neon lighting, possibly even in other fields, will continue to be found. Of the progress made in the short time since its first commercial application here in the West there can only be said one thing: it has been almost phenominal. To neon lighting can be credited the introduction of a new color to illumination, a color which is reflecting itself in the increased use of electricity in all types of sign and decorative lighting, so that our cities were never so brilliant as they are—tonight.

What Servants Will Do for a Cent

Based on a national average domestic rate of 7.64 cents per kw-hr. 1 cent's worth of electricity will operate continuously the following appliances:

	Min.
Vacuum cleaner	52
Washing machine	26
Ironing machine	18
Chafing dish	18
Electric phonograph	3 hr. 20
Six-pound iron	14
Three-pound iron	24
Electric piano	1 hr. 3
Hair dryer	2 hr. 15
Radiant heater	13
Immersion heater	26
Cream and salad whipper	2 hr. 15
Coffee percolator	14
Dishwasher	32
Ice cream freezer	26
Toaster	15
Grill	13
Heating pad	2 hr. 25
Utility motor	2 hr. 15
Bread mixer	39
Sewing machine motor	2 hr. 15
Cigar Lighter	15
Flavor mixer	2 hr. 15
Waffle iron	13
Vibrator	2 hr. 15
Automobile heater	1 hr. 10
Curling iron	5 hr. 25
Portable lamp (50-watt lamp)	2 hr. 51

Quality Sung in Verse

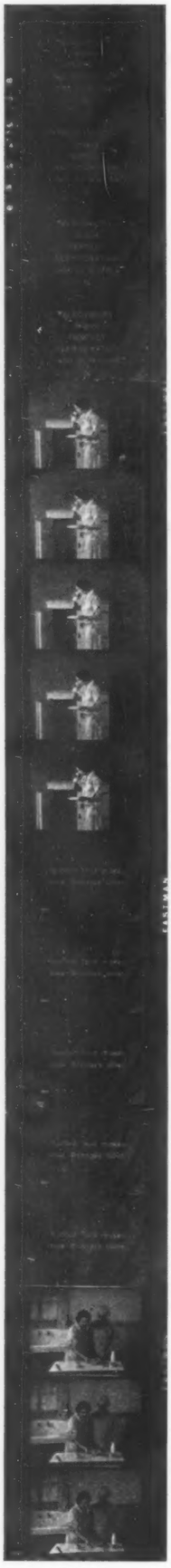
The Bellflower Electric and Radio Shop, operated by **L. E. Gordanier,** has moved into its new and attractive store at 607 Somerset Street, Bellflower, Calif. Mr. Gordanier's cards carry the following poem:

Gardanier's Motto

Don't try to buy a thing too cheap
From those with things to sell—
Because the goods you'll have to keep,
And time will always tell.
The goods you'll get will stay;
The price you paid you'll soon forget
The price you will not long regret—
The quality you may.

They ought to cut this "price" word out
Of dictionaries read,
Make Value what men talk about,
Not just the price instead.
In food or metal, glass or wood,
Remember this advice:
Don't let the price control the goods,
But goods control the price.

A number of neon sign applications, both in connection with ordinary sign letters and alone. A feature of the neon tube sign is the possibility of having a continuous line letter every portion of which glows with equal brilliance and intensity.



Moving Pictures Demonstrate and Sell Electric Refrigeration

Visualized Advantages of Electric Refrigeration Convince Prospects Quickly and Often Decide Sales

THIS is an age of action. No one knows this better than the advertiser. Window displays today, in all lines of merchandise, are made up largely of figures that move; models either live or mechanical, that pose, gesture, imitate; mechanical toys that operate electrically or through spring mechanism; electric sewing machines, hemstitching, guiding their own material; washing machines swishing clothes through bubbling suds—action, animated advertising. Crowds watch as long as the action continues; the window becomes a "still" and the crowd melts away.

Realizing the necessity of arousing people's interest, as well as holding it, through action, the Public Service Company of Colorado, Denver, has been making use of motion picture advertising for three years. Each year has more firmly convinced them that the stimulation in electrical refrigerator and radio sales more than justifies them in employing this form of animated advertising.

"We feel that motion picture advertising," said J. M. Eakins, general manager of the electrical refrigeration department, "after a careful check of sales covering a period of three years, is a medium of advertising which the Public Service Company cannot afford to discontinue. At least 8 per cent of all our sales of electric refrigerators can be traced directly to the use of motion picture advertising playlets." This sales percentage, Mr. Eakins stated, in comparison with returns from other forms of advertising based on the compartive costs, is very satisfactory, and has led to the company's renewal this year of a 26-weeks advertising contract with a film company.

The check on radio sales, acording to Mr. Eakins, is rather indefinite since the motion picture advertising is employed only during "radio season" and at a time when there is so much publicity given to radios through innumerable other channels that it is almost impossible to determine the exact medium through which a customer was reached.

The motion picture advertising idea is put across by means of interesting little playlets, such for instance as the following: A picture is thrown on the screen of a housewife leaving her work on a busy Monday and going to the old fashioned icebox for a hurried lunch. She finds the milk soured, food spoiled. She registers keen disappointment and disgust. Then follows the title—"Spoiled food makes blue Monday bluer." Follows a scene in her neighbor's home, with the neighbor removing food which has kept perfectly in her electric. She is shown exhibiting the efficiency of her refrigerator to the disgusted housewife, with the title, "Her neighbor has no such worries," followed by "Electricity makes perfect refrigeration with no trouble." The playlet is completed by the "trailer"—the advertising strip containing the name of the Public Service Company, address and telephone number, together with a few words tying up with the merchandising idea put over in the playlet.

A second playlet used often by this company shows a young woman displaying her electric refrigerator to admiring friends, with the words, "Our electric refrigerator keeps things so pure and wholesome." Her friends exclaim enthusiastically, "Electric refrigeration is wonderful!"

The publicity department of the Public Service Company is responsible for many of the merchandising ideas embodied in the playlet, also for the titles. Use is made also of stock titles and ideas which the film company maintains, covering a wide variety of merchandise.

Twelve Theaters Show Playlet

The past year the Public Service Company has delivered a "broadside" attack in their publicity campaign, which covers electrical refrigeration as well as radio, by putting on their advertising at a string of 12 theaters simultaneously. The release of the films is arranged so that every third week the picture house is showing the same film again, the playlets traveling around the circle of 12 picture houses with an interval of two weeks between films. It has been found that a lapse of time between films brings better results and arouses keener interest than if the films are shown each week. People become so accustomed to the advertising, if the latter method is employed, that the message fails to register. The same trailer, however, is used only two weeks, then changed to something entirely new, lest the public lose interest in the most essential part of the film, the advertiser's name. The same attention is devoted to obtaining novel and startling effects in the trailer as in the playlet. The trailer is generally constructed through trick photography; the letters juggle themselves through the air, flowers blossom explosively, etc., revealing the name of the advertiser. It arouses an interest which automatically imprints the name and telephone number of the advertiser upon the onlooker's mind.

Motion picture advertising is not new, but it is only during the last year or so that it has been perfected to the point where concrete facts can be put before the public in a manner which will be satisfactory to both advertiser and public. The public is now reading adavertising and is **made to like it.** Secondly, the advertiser is reasonably sure of returns commensurate with his outlay of money.

100 Per Cent Attention

It is claimed that other methods of advertising have a greater circulation, but it must be conceded that motion picture advertising gets the undivided attention of every person in the theater audience. In other words the action picture registers with 100 per cent of the onlookers. People cannot help but read the advertisements unless they deliberately close their eyes, and it is not likely that they will do this if advertising playlets are sufficiently entertaining. If the playlets are based on some humorous twist or unique angle they will serve as a sort of preliminary "cocktail"—a mental appetizer, as it were, to prepare the audience for the heavier meal to follow.

Then, too, the message put over in motion pictures comes at the psychological moment when the spectator is in an ideally receptive mood. He has left behind him all the perplexing cares of the day and has come to the theater for relaxation and entertainment. The cleverness and originality of the playlets, together with the mental picture of the article exploited, register in the subconscious mind to take form later in the expressed desire to possess, or at least know more about said article.

There are two other factors besides action to be taken into consideration. We are living not only in an age of action, but in one of speed and brevity. The nation as a whole, and individually, demands both. Advertising copy of today must say in a paragraph, in a single line, what formerly comprised a page. The playlet takes less than 60 seconds to get a message across. Tell the same story vividly in words and it will take approximately 300 times as long to read.

The cost of motion picture advertising depends largely upon the "circulation," or average attendance at the theaters. It is based also upon the type of playlet used and the location of the theater in which the film is shown. The playlets used by the Public Service Company run from $90 to $120 per month for the string of 12 theaters. All of these picture houses are suburban theaters with an average attendance of 6,000 a week per theater. Some of the houses will run much higher than that but that is a fair average. A film shown, then, in the 12 houses for a period of one week will get the message across to some 72,000 people, with approximately 100 per cent of the theater goers absorbing the message. A 26-weeks contract, which is the usual contract term, gets the advertisement before over a million people! Naturally, many of these people are "repeats," but through the force of accumulative suggestion they are that much nearer becoming an actual purchaser than the first time they saw the advertisement.

The Public Service Company finds that it does not pay to advertise via moving pictures in the large down-town theaters. There houses depend largely for their attendance upon the transient population of the city, those who live in hotels, apartment houses, or rented houses. They are not the class of people who will respond to motion picture advertising for refrigerators and radios. The suburban theater is in the heart of the middle-class districts, the home-owners and the thrifty wage-earners who take pride in the ownership of a refrigerator or radio.

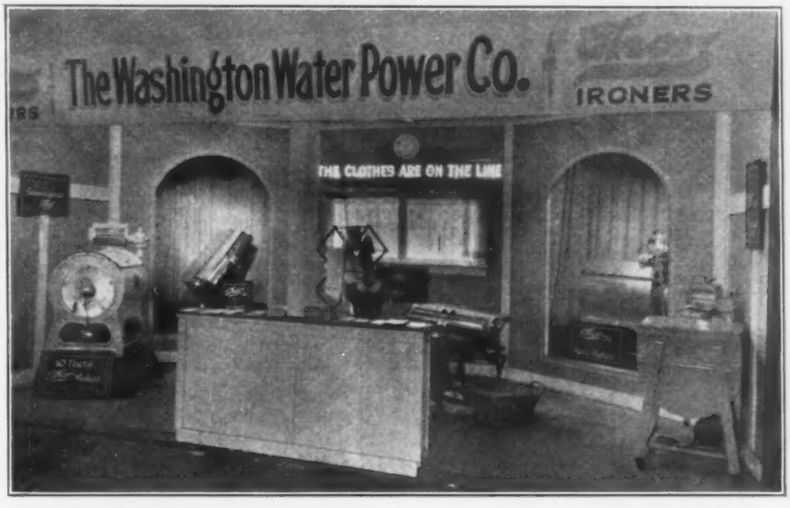
In order to eliminate the possibility of booking films with a theater that is not a good risk in the suburban districts, a careful survey and check is made of residents in districts before signing up the theater.

The Public Service Company has several efficient methods of doing this. One is the practice of house-to-house advertising, a method which this company employs. Thus, undesirable possible patrons are weeded out; the type of individual who would buy because the privilege of deferred payments was granted him, but who, most likely, would never finish paying for the purchase. The second advantage the company has is the checking up on the monthly gas bills in any particular district. Invariably the residents of the thrifty, dependable neighborhoods are the ones who take advantage of their 10 per cent discount if paid before a certain date. The poor risk is just as invariably found in the class of people who are improvident and pay at the last minute, thus losing their discount.

A careful check of all refrigerator sales made in districts covered by motion picture advertising is kept, in order to obtain definite data as to the medium through which a customer is sold. So thorough is this check that during a six-weeks period in the summer eleven sales of refrigerators were traced directly to customers having seen the playlet, which registered its message so strongly and effectively that sales were made within a few days afterwards.

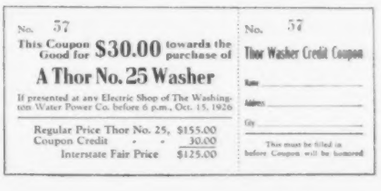
"The motion picture advertising not only brings customers directly to us, but is especially fine for inquiries," Mr. Eakins stated. "We mail the prospective customer a questionnaire, obtaining all the information we can as to when and where the picture was seen, etc. Then this is followed up by personal salesmanship that results in a large percentage of actual sales."

Home Laundry Equipment Featured



In order to stimulate interest in Thor washers and ironers, The Washington Water Power Company exhibited several of these machines in an especially attractive booth at a Spokane interstate fair. Salesmen capable of answering questions and demonstrating equipment were in the booth during all hours that the fair was open.

Special coupons were used to get sales prospects, which were distributed to those sufficiently interested in the exhibit to give their names and addresses. In return they received this coupon which entitled them to a $30 reduction in price on the Thor No. 25 washer if purchased before a certain date. Some 250 live prospects were secured in this way.


No. 57
This Coupon Good for **$30.00** towards the purchase of
A Thor No. 25 Washer
If presented at any Electric Shop of The Washington Water Power Co. before 6 p.m., Oct. 15, 1926
Regular Price Thor No. 25, $155.00
Coupon Credit - - 30.00
Interstate Fair Price $125.00

No. 57
Thor Washer Credit Coupon
Name
Address
City
This must be filled in before Coupon will be honored

All-Electric Home Economy Proved by Contractor in Own Home

NOTHING is more convincing in talking electrical cooking and heating than an actual list of bills. Many an electrical contractor has found himself in a predicament when a customer prospect has asked, "Do you have one yourself?" The most successful dealers in electrical equipment for the home have been those owning complete electric homes of their own.

George C. Foss, electrical contractor and engineer of Sacramento, Calif., in 1924 decided to build an all-electric home. He decided at the same time to keep an accurate record of the cost of operating that home in order to be able to talk intelligently with future prospects for home electrification.

His home was completed in March, 1925, and a complete record of the bills indicates that for the first twelve months the average cost per month was $17.39 and for 1926, with the addition of extra equipment, was only $19.84 per month.

Of his home Mr. Foss says: "The house is made up of six rooms not including the den, breakfast room, or nursery. I call it nine but the wife says six, so she wins." Air heaters of ample capacity are used throughout the house. Cooking is done on a 9-kw. range; a 30-gal. 3 or 5-kw. water heater is used. Concealed exhaust fans are used in both the kitchen and den. The house is well lighted from center and bracket outlets and closet lights are used throughout. There are about four convenience outlets per room on the average. An electric refrigerator is installed also.

Of additional equipment Mr. Foss says: "There is an electric door opener to help me in nights, a radio with loudspeaker set in the vestibule, public phone, as well as private phones on both upper and lower floors."

A list of the bills for the two years and a half since the home was built follows:

Year 1925

April	21	$ 10.12
May	21	9.43
June	20	10.05
July	23	8.35
Aug.	22	7.75
Sept.	22	9.25
Oct.	22	10.31
Nov.	20	21.23
Dec.	18	25.73
Jan.	20	58.17
Feb.	20	18.97
Mar.	20	19.27
Cost for 12 months		$208.63
Average cost per month		$ 17.39

Electric home of George Foss, Sacramento contractor, whose monthly operating costs are reproduced here.

Year 1926

April	20	$ 13.87
May	22	11.23
June	22	12.89
July	23	10.47
Aug.	24	11.18
Sept.	24	14.15
Oct.	22	14.15
Nov.	23	14.15
Dec.	23	19.56
Jan.	22	39.87
Feb.	23	45.45
Mar.	23	21.07
Cost for 12 months		$238.04
Average cost per month		$ 19.84

Year 1927

April	22	$18.57
May	21	14.15 (minimum charge)
June	21	14.15 (minimum charge)
July	21	14.15 (minimum charge)
Aug.	21	14.15 (minimum charge)

Actual Bills

May	$12.73
June	14.11
July	8.83
August	7.14

Advertising by the Yard

MANY electrical retailers, no doubt, measure their business success by the yard-stick of sales volume achieved from year to year. For the outlying electrical retailer who finds newspaper advertising out of his range of sales fire, however, there is probably no better method of building up sales volume in an inexpensive but highly effective manner than by putting a brief sales message across by means of the old reliable advertising yardstick.

It not only receives a cordial welcome in every home it visits, but it is used time and again. It is not destroyed or pitched into the willow basket like other forms of advertising. It has a direct appeal to the home owner. It stays around the house where it is frequently used and so is constantly delivering its sales message to the customer, and reminding him where to buy his electrical merchandise.

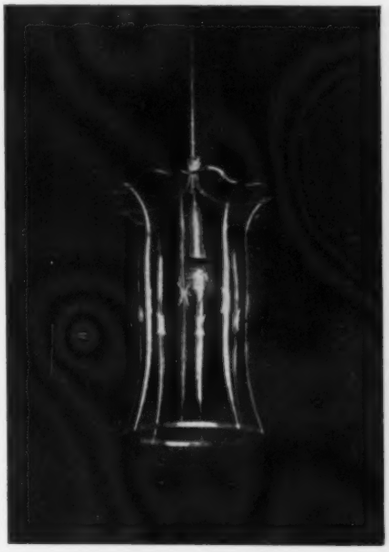
At least this is the experience of an electrical retailer who buys 1,000 yardsticks at a time, and then distributes them in virgin territory via his colored delivery boy, who goes from house to house ringing doorbells and handing the yardstick to the housewife. They don't like to be without this little handy household accessory, and they always know where to get another for each yardstick has the name, address and telephone number of the electrical retailer printed on it in bold-face type.

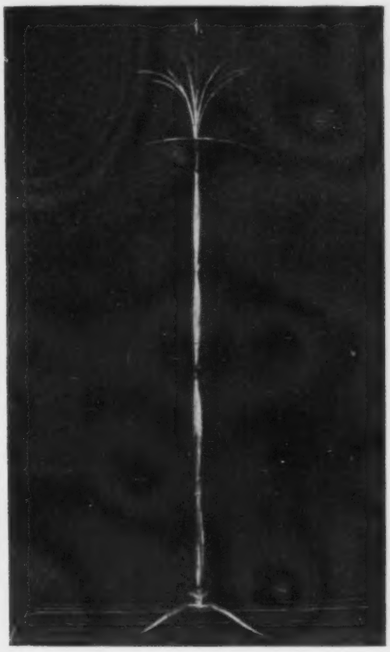
"It's the best advertisement that we have ever used," is the way this enthusiastic electrical retailer puts it. "People are all the time complimenting us about it, and we get a lot of new business in this way. It also brings us plenty of repeat business. We are well sold on this idea of advertising by the yard, and it is, of course, also inexpensive, and above all, good salesmanship."

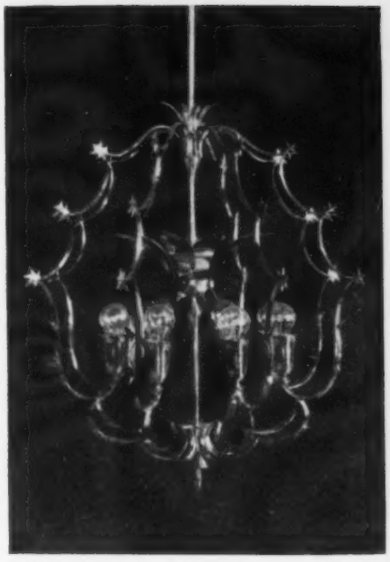
Futuristic Treatment of Lighting Fixtures

German and French Adaptations of Familiar Lantern, Cluster, Candle and Indirect Fixtures of Interest to Designers

Daring departures from the conventional imitations of period lanterns, etc., are evident in these artistic designs.

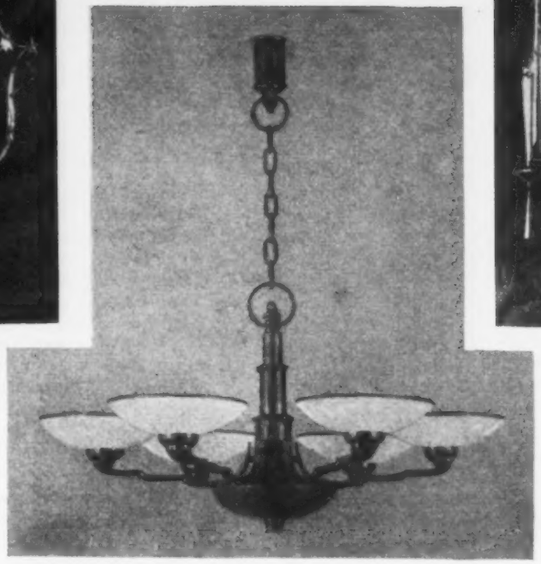




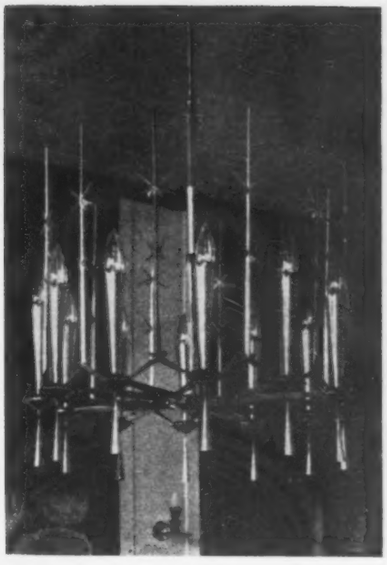


An interesting adaption of the lantern is shown in the upper picture. Instead of the customary grills or straight shafts the finely drawn lines in graceful curves in this lantern give an entirely novel effect.

Stars and slender strands of metal add to this adaptation of the cluster fixture a distinctiveness that is unique. The usual scrolls and plates are notoriously absent. Line rather than form is emphasized in the lower fixture.



An interesting treatment of the urn is shown in the upper picture. The "flower" of illuminated metal is striking. An indirect fixture of interest is the lower fixture, with its alabaster platters.



The upper stand lamp is an example of geometrical design characteristic of the moderns applied to lighting. It is interesting although its adaptability to surroundings will be limited.

Ecclesiastical in effect is this modern candelabra. The interesting departure from candle imitations is unique and the ascending spires and stars give it a gothic effect. American designers can profit from these ideas and extend them.

News of the Industry

No Agreement Reached on Price of Colorado River Power

Conferences that were held daily in San Francisco starting Nov. 21 between members of the Colorado River commissions of the States of Arizona, Nevada and California, their state engineers, consulting electrical engineers and other advisors in an effort to determine what price Arizona and Nevada should receive from California for hydro-electric power to be generated if and when Boulder Dam is built, were terminated Dec. 17. At the close of the conference it was stated that while California had offered to pay a higher amount than its previous offer of four-tenths of a mill a kilowatt-hour made at the last Denver conference, the figure had proved unacceptable to Arizona and Nevada. The price named by California was not made public. At the Denver conference one mill a kilowatt-hour had been asked by the other two states. One of the main difficulties that confronted the engineers at the San Francisco meeting was the determination of the probable cost of power at the time Boulder Dam is completed, which generally is set at ten years from the time the bill is passed.

George Malone, state engineer of Nevada, who acted as chairman of the conference, in an interview after its close said in part: "The next action will be taken when the Colorado commissions of the three states go to Washington early next year to talk with the Congressional committee having the Boulder Dam Bill in hand. Each commission will urge that certain provisions be incorporated in the bill. No commission will oppose the bill unless it finds that its state is being put at a decided disadvantage. Final decision will rest with the Congressional committee." The committee referred to is the commitete on irrigation and reclamation.

H. W. Crozier of San Francisco, who acted as consulting engineer for the Nevada commission, stated that he felt that at this series of hearings a great deal had been accomplished in getting at all the facts through the thorough study of the engineering and electrical problems involved.

Dispatches from Denver state that at a meeting held there Dec. 19 by representatives of the four states of the upper basin of the Colorado River a resolution was adopted opposing passage of any legislation proposing the construction of a dam at Boulder Canyon or any other development pending the outcome of negotiations among the three lower basin states, Arizona, California and Nevada. The resolution was signed by the respective governors of Wyoming, Colorado and Utah, by representatives of the governor of New Mexico, who was unable to be present, by Colorado and New Mexico Interstate River Commissioners, a representative of the City and County of Denver, and the Colorado attorney-general.

Pacific Gas and Electric Votes to Increase Capital Stock

An increase in capitalization from $160,000,000 to $400,000,000 was voted Dec. 21 by the directors of the Pacific Gas and Electric Company, San Francisco. Subject to the approval of the California Railroad Commission, this action will be submitted for ratification to the stockholders at a special meeting called for Feb. 13, 1928. The increase will add $120,000,000 to the authorized preferred stock and a similar amount to the authorized common shares. The stockholders' approval of the creation of a 5½ per cent preferred and a 5 per cent preferred stock also will be asked.

At present the company's capitalization stands; 6 per cent preferred (par value $25)—authorized $80,000,000, outstanding $69,965,457; common (par value $25)—authorized $80,000,000, outstanding $69,280,440. Under the proposed increase the capitalization will be: 6 per cent preferred—authorized $140,000,000; 5½ per cent $40,000,000; 5 per cent $20,000,000; common—authorized $200,000,000; with outstanding stock as stated. Following the filing of an application with the Railroad Commission, the directors of the company stated that rights would be given to stockholders in the ratio of one share of the new stock to ten shares of the present stock at par value of $25.

Memorial Park in Honor of Former Chief Engineer Built by Idaho Company

IN HONOR of Willis Henry Trenner, who until his death on March 6, 1921, was chief engineer and superintendent of power of the Idaho Power Company, that company has built the Trenner Memorial Park.

The memorial park is built upon a rocky outcrop in the bed of Snake River at American Falls adjoining the company's American Falls power plant. Terraced from the river level in three elevations, each grade is maintained by smooth-trim lava rock and has a jagged-rock parapet. The floorings will be set out in grass, flowers and shrubbery as the seasons permit.

Upon the higher terrace, which opens out from the upper floor of the power station, are a pergola of heavy timber; a fountain-monolith of irregular lava rock into which is set a replica of the power station, surrounded by a lava-rock pool; and the memorial, which is built of rope-lava. In front of this shaft is a small pile of lava from which a beam of light shines out at night upon the bronze tablet embedded in the memorial. The inscription reads: "In memory of Willis Henry Trenner. A testimony to his eminent and useful service as an engineer in the establishment and development of the hydro-electric industry of southern Idaho."

Prior to 1908 Mr. Trenner had been connected with the Tacoma Railway, Light & Power Company, the Light and Power Department of the City of Tacoma, and the Portland Railway, Light and Power Company of Portland, now the Portland Electric Power Company, but after that date his work kept him continually in Idaho where he ranks as one of the pioneers of the more modern electrical development in the southern part of that state. He served as chief engineer of the Idaho-Oregon Light & Power Company and as chief engineer, or in a similar capacity, for all the several predecessor companies of the Idaho Power Company, until he was made chief engineer and superintendent of power.

The memorial recently was dedicated to its purpose by Henry L. Senger, chief engineer of the Idaho Power Company, in the presence of members of the organization.

Organization Changes Made by Idaho Power Company

A new operating division has been added to its system by the Idaho Power Company through the subdivision of its former Twin Falls Division. The new section, known as the Jerome Division, with headquarters at Jerome, includes all of the territory of the former Twin Falls Division on the north side of the Snake River. The rest of the territory, on the south side of the Snake River, will continue to be known as the Twin Falls Division, with headquarters at Twin Falls.

Changes in personnel also have been announced by the company. These include the transfer of Charles Neely, for the past seven and one-half years manager of the Twin Falls Division, to Boise as assistant to R. B. King, general superintendent. J. D. Orr, the former Payette Division manager, has been made manager of the Twin Falls Division, and Kinsey M. Robinson, formerly division engineer for the Payette Division, is now division manager at Payette. Arthur I. Sawyer, formerly Payette Division meterman, has succeeded Mr. Robinson as division engineer. R. W. Carpenter, who has been serving as local agent at Nampa, has been chosen as manager of the new Jerome Division, and S. L. Sullivan of Jerome has been made Jerome Division engineer. R. W. Mangun, of Glenns Ferry, is now local agent at Nampa.

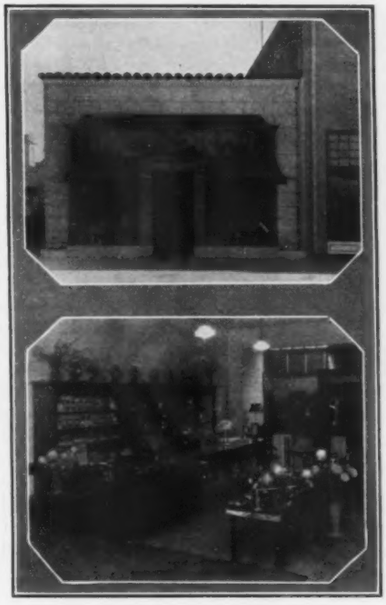
Loan Funds Established by Swope and General Electric Co.

The establishment of a loan fund of $25,000, the gift of Gerard Swope, president, General Electric Company, has been announced by Charles Alexander Richmond, president of Union College. Under the provisions of the gift, loans are to be awarded to employees or sons of employees of the General Electric Company and International General Electric Company in the United States and to other students of Union College of not less than one year residence at the college.

Simultaneously with this announcement, Mr. Swope made known that the board of directors of the General Electric Company also has set aside $25,000 to be used as a loan fund for the education of employees or sons of employees of the General Electric Company, but with no restrictions on them as to the college they may wish to attend.

Mount Spokane Company Buys Small Company.—The Bull Dog Creek Electric Company of Valley, Wash., has been acquired by the Mount Spokane Power Company, Deer Park, Wash. The system includes a small generating station and extensive rural lines serving territory north of Spokane. The purchasing company has taken up a number of small companies in its territory with 1,000 customers now served from about 125 miles of transmission and a similar amount of distribution lines.

San Diego Company Opens New Office and Store



More than 1,000 people attended the recent formal opening of the new office and appliance store of the San Diego Consolidated Gas & Electric Company at Chula Vista, Calif., which marked the establishment of the company's sixth merchandising store in outlying districts within the past few months. During the evening demonstrations of the numerous electrical appliances on display were given, music was furnished by radio, and attendance prizes consisting of an electric iron, lamp, vacuum pick-up, electric toaster and popcorn popper were awarded.

Great Western Company Makes Changes in Organization

Organizational changes in the Great Western Power Company have resulted in the transfer of F. H. Woodward, since 1922 general sales manager, with headquarters in San Francisco, as manager of the company's Oakland Division with headquarters in that city. The position as general sales manager in the San Francisco office has been abolished.

F. H. WOODWARD

He succeeds G. W. Bernhard, who has been made industrial heating engineer and will work out of the San Francisco office.

Mr. Woodward is returning to familiar territory, for he served as manager of the Great Western company's Oakland Division from 1912 to 1922, when he was made general sales manager in San Francisco. He has been connected with the company for the past eighteen years, having entered its employ in 1909 in charge of industrial power sales.

Seattle Light Department to Continue Selling Policy

The Seattle Light Department, for the time being at least, will continue to sell electrical goods. The city council reached that decision when it found that a compromise measure it had offered, restricting merchandising of equipment to appliances requiring more than 500 watts, met with the approval of neither merchants who retail electrical equipment nor of spokesmen who said they represented citizens and consumers.

The citizens' group protested any curtailment of the department's retail division, while the retailers declared they wanted the Light Department to abandon its merchandising entirely. They particularly protested the continued sale of ranges and water heaters, declaring that the retailers cannot compete with the municipal Light Department in these sales and urging their complete discontinuance by the department.

J. D. Ross, superintendent of lighting, offered to eliminate from the department's retail stock goods requiring less than 660 watts, after the Puget Sound Power & Light Company, the city's competitor, announced its intention to discontinue the sale of small electrical appliances but to continue selling ranges and water heaters (Electrical West, November, 1927, p. 297). The 500-watt compromise then was offered by the council but was rejected by the retailers as promising no relief from the condition against which they were protesting. The council as a whole favors continuing the present policy of selling ranges and larger appliances by the municipal Light Department.

Seattle Plans Four-Year Program for Skagit Development

By a vote of eight to one, the Seattle City Council passed the "plan or system" ordinance specifying a four-year program for construction at the Skagit hydro-electric development, and authorizing an $8,650,000 bond issue, to finance the work. The system of development planned provides construction of an Ambursen type dam at Hanging Rock; a power house at Diablo Canyon, and a second main transmission line from the Skagit project to Seattle.

Two Idaho Power Employees Are Awarded Insull Medals

Two members of the Idaho Power Company's organization have been awarded the Insull Medal. They are Frank C. Poage, electrical engineer

FRANK C. POAGE

in the engineering department of the general office at Boise, and Jack E. Woodhead, chief operator of the Lower Salmon Falls power station.

Mr. Poage, assisted by Howard E. Waterman, also an electrical engineer in the employ of the company, saved the life of Everett T. Allen, operator at the Thousand Springs generating station of the company on Oct. 30, 1926. Mr. Allen was opening a set of 44-kv. outdoor disconnecting switches installed on a steel switch tower, when upon opening the third switch one of the switch insulators flashed over, starting an arc to the steel structure. Mr. Allen jumped from the platform in an attempt to reach the station switchboard, apparently receiving a shock the instant both feet struck the earth, and then he struck the steel tower receiving a severe burn. Mr. Poage and Mr. Waterman, who happened to be in the plant working on relays, ran to Mr. Allen's assistance. Mr. Poage immediately started the application of the Schaefer prone pressure method of resuscitation, and after about two minutes' work Mr. Allen regained consciousness. As the result of the accident it was found necessary to amputate both feet.

The other resuscitation occurred on Nov. 16, 1926. Frank M. Gregg, operator at the Lower Salmon generating station of the Idaho Power Company, was called upon to open a 44-kv. rotary pole-top air-break switch at the Hagerman substation, Hagerman, Idaho. The operation of this switch is effected by an operating handle located on the pole

JACK E. WOODHEAD

about 10 ft. above the earth. The operating handle is connected to the switch above by means of a 1¼-in. iron pipe. Mr. Gregg, climbing the pole with linemen's climbers, tried the switch and finding it stuck, gave it a hard pull. When he did this the mechanism above broke and in falling came in contact with an energized 44-kv. conductor. As he realized the operating rod had broken he swung his left arm around the pole, putting it in direct contact with a ground wire and grounded conduit. The operating rod came in contact with his body, putting him in series with the circuit from conductor to ground.

Jack E. Woodhead, who had been watching the work, removed to the earth with the aid of a passerby, the apparently lifeless body. He immediately laid it out and began application of the Schaefer method, and after about five minutes' work he brought Mr. Gregg back to consciousness. But the burns received by Mr. Gregg were very severe, and he died approximately 29 hours after the accident.

W. R. Putman, general manager of the company, was delegated by the National Electric Light Association to present the medals and certificates accompanying them to Mr. Poage and Mr. Woodhead.

Three Affiliated Portland Companies Move Into New Public Service Building

Although public dedication will not take place until Jan. 3, the new Public Service Building, Portland, was occupied Dec. 19 by the three affiliated companies for which it was built. All but six floors of the sixteen-story tower structure, flanked by three-story wings, are occupied by all departments of the Portland Gas & Coke Company, Northwestern Electric Company, and Pacific Power & Light Company.

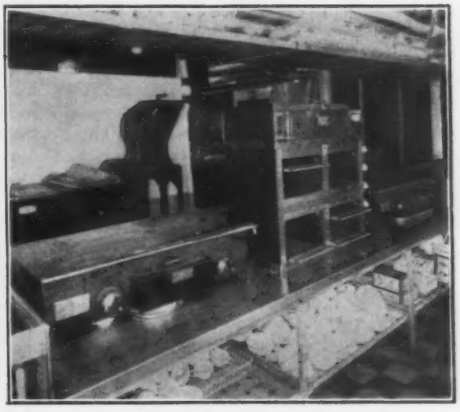
The building is faced with white stone and has a colonnade course around the top floors. A vaulted lobby reached from the main entrance on Sixth St. opens on either side into the salesrooms of the Northwestern Electric Company and the Portland Gas & Coke Company. Connecting these rooms along the rear of the building is a long counter for cashiers and contract and complaint clerks of the two companies. Bookkeeping departments occupy the mezzanine balcony surrounding the sales rooms on three sides, and the second floor of the building. The third floor contains employees' rest rooms, a library and auditorium and has space for a restaurant. The operating and engineering departments of the gas company, the Northwestern company and the Pacific company occupy the fourth, fifth and sixth floors, respectively, while the treasury departments of the three companies are located on the seventh and eighth floors. The president's offices and those of the legal department and the directors' room are on the fifteenth floor. A skylighted drafting room on the sixteenth floor completes the present use made of the building by its owners. Space on floors nine to fourteen is for rent to the public.

Public Service Building, Portland, Ore.

Special attention has been given to the lighting of the offices and salesrooms, both of which have a higher intensity than other commercial establishments of their kind in the city. Many of the fixtures, such as those in the lobby and executive offices, were especially designed to harmonize with the architectural embellishments and interior decoration. Specially designed window lighting is likewise a feature. The building is topped by a large neon sign in three colors in the form of a square with its messages facing four directions, and the top floor is floodlighted in white. Elevator service is provided by four of the latest model signal control, main motor, micro leveler elevators.

New 88-kv. Line Between San Bernardino and Imperial Valley Completed—The Southern Sierras Power Company, Riverside, Calif., has completed a new 88-kv. transmission line between San Bernardino and the Imperial Valley, a distance of 67 miles. This provides the company with two main transmission lines into the Imperial Valley. The line is of woodpole, steel-wish-bone type, with suspended insulators and heavy copper wire. The cost of the line has been set at about $4,200 a mile and with switching and terminal facilities will total close to $350,000.

An Electrically Equipped "Flying Fish"



Copyright Aerograph Co., Oakland. *Photographs courtesy Matson Line.*

Electrical equipment adds much to the well-being of the passengers on board the S. S. Malolo, the fine new addition to the Matson Navigation Company's fleet plying between San Francisco and Honolulu. All the food is prepared and cooked electrically, and the galley equipment includes 10 heavy-duty electric ranges, 2 heavy-duty electric broilers, two electric ovens, 3 heavy-service griddles, choppers and grinders, bread and cake mixers, grills, toasters and ice cream freezers. All auxiliary motor equipment is electrical. The ship is ventilated by an automatic system operated by electrical blowers; there are electric passenger elevators; electrical horses and similar devices are found in the gymnasium. The attractive lighting fixtures throughout the ship are of the most modern type, while reading lamps, shaded lights at the shaving mirrors and bright lights at the dressing tables, with adjoining wall plugs for curling irons, make for comfort and convenience in the staterooms.

The Malolo, which in the Hawaiian tongue means "flying fish," was built by the William Cramp & Sons Ship and Engine Building Company, Philadelphia. She has a length of 582 ft.; beam of 83 ft.; speed of 23 knots per hr.; shaft horsepower, 25,000; twin screw turbines; and a passenger capacity of 650, all first class.

Illustrations show the Malolo entering San Francisco Bay for the first time, a portion of the galley with some of the electric ranges, and a third the heavy-service griddles.

Rate Reduction Announced by B. C. Electric Company

A reduction in lighting rates has been announced by the British Columbia Electric Railway Company, Ltd., effective Jan. 1.

The new rates in Vancouver will be 4 cents a kw.-hr. for the first 3 kw.-hr. per 100 sq.ft. of floor area instead of 4½ cents for the same quantity. All current in addition will be at 2 cents a kw.-hr. as before. A further variation takes place in the quantity charged at the first rate. Under the new rate, houses having 1,000 sq.ft. of floor area or less will pay for 30 kw.-hr. at the first step of the rate. Larger houses will pay for 2 kw.-hr. for every 100 sq.ft. extra up to 2,000 sq.ft. and then 1 kw.-hr. for every 100 sq.ft. over 2,000 and up to 3,000, which is the maximum.

In the suburbs the rates will be 5 cents and 2 cents instead of 5½ cents and 2 cents, under the same conditions of usage. In Victoria rates will go down from 7 cents to 6 cents a kw.-hr. with the abolition of the meter charge but with the inauguration of a minimum charge of $1 a month.

Industrial rates will be 4 cents and 2 cents instead of 4½ cents and 2 cents. The quantity at the first step also will be reduced from 100 kw.-hr. per kilowatt of demand to 65 kw.-hr.

In 1917 the rate charged for domestic lighting in Vancouver was 8.8 cents net with a meter charge of 25 cents a month and no minimum. Since then the British Columbia company has pursued a policy of voluntarily reducing rates whenever possible. There is no public utilities commission in British Columbia, and rates are not subject to regulation by any public body.

New York Library Seeks Copies of the Journal of Electricity—The New York Public Library in an effort to complete its files seeks the following issues of the Journal of Electricity, Power and Gas: Number 10 (Sept. 4, 1915) of Vol. 35; Numbers 1, 6, 9, and 11 (July 1, Aug. 5, Aug. 26, and Sept 9, 1916) of Vol. 37; Numbers 1 and 2 (Jan. 1 and Jan. 15, 1917) of Vol. 38, and the following issues of the Journal of Electricity: Number 4, 5, 6, 7, 8, 9, 11 and 12 (Aug. 15, Sept. 1, Sept 15, Oct. 1, Oct. 15, Nov. 1, Dec. 1, Dec. 15, 1918) of Vol. 41; Number 1 (Jan. 1, 1919) of Vol. 42. Charles Cannon, chief of acquisition division, 476 Fifth Ave., New York City, states that the library will greatly apprectiate it if some readers who no longer need their copies will send them to the address given.

Northwest Electric Light & Power Association

Commercial Section Progress and Plans Heard at Meeting

Reports on the progress of studies for the year and discussion of plans for a continuation of the work were heard from each committee chairman at a meeting of the executive committee of the Commercial Section, Northwest Electric Light and Power Association, Portland, Dec. 2. Committee attention is to be focused on this outline of work until the midwinter meeting of the section in February, after which the year's work is to be rounded into shape for the convention. Dates for the midwinter meeting, to which the entire section is invited for detailed discussion, were set as Feb. 20-21, 1928, in Portland.

All committees reported and suggestions were offered as to possible studies to be pursued. Among the proposed activities are the following: The commercial cooking committee will gather data tending to show the possibilities for load building in this field and the manner in which such load can be secured. The merchandising committee will confine its activities to pointing out ways of promoting the sale of small appliances, and to showing the value of

the small appliance load. A survey of the possible application of electric heat in industry in the territory will be undertaken by the industrial heating committee. The rural electric service committee will seek ways and means of placing in the hands of rural service men in usable form the many facts and findings of the various state committees on the relation of electricity to agriculture. The street and highway lighting committee will produce data to show the value of such lighting to the public and to highway commissions.

The home and industrial lighting committee, which early in the association year laid its plans to carry the story of light to the business men by a series of talks before luncheon clubs in the leading cities in the territory, reported that ten of these talks had been delivered, leaving twenty more on the present schedule.

Women to Synchronize Work with National Committee

Plans for local activities and for synchronism with the National Women's Committee program were discussed at length at the first meeting this year of the Women's Committee of the Northwest Electric Light and Power Association at Spokane. Eleven of the twelve members answered the call of the chairman, Mary K. Walsh, The Washington Water Power Company, Spokane, to attend the meeting.

The meeting was addressed by J. E. E. Royer, assistant general manager, The Washington Water Power Company, who stressed as major subjects for study, "Electricity in the Home" and "Proper Attitude Toward the Public"; and by W. H. Ude, director of public relations of the company, who outlined the functions of a company public relations department.

The chairman announced that the public speaking contest to be sponsored by the public information committee of the Public Relations Section will be open to women employees as well as men. In addition, the Women's Committee will conduct an essay contest on a subject to be announced, for which the winner in each company will be given a prize of $25 and a trip to the convention. Reports of committee members on the activities of their local women's committees indicated that those committees are meeting regularly and conducting programs on the subjects recommended by the national committee. The three subcommittees formed last year to study personnel problems, co-operation with women's clubs, and programs for smaller companies, are continuing their work.

Marguerite Butler, Portland Electric Power Company, Portland, reporting on the meeting of the National Women's Committee which she attended in Chicago in August, told of the desire of the National Committee to have divisional committees inform themselves on the Boulder Dam project. To this end an analysis of the Swing-Johnson Bill by Paul S. Clapp, managing director, N.E.L.A., was distributed. Further literature bearing on the study of political or private ownership of industry also was distributed. It likewise was suggested that when studying the economics of utilities some attention be given to rates, since it is thought the Women's Committee should be prepared on this subject, which is being investigated by the National League of Women Voters.

It was decided that the next meeting of the committee should be held in Seattle later in the winter, the date to be set subsequently.

With the formation of a woman's committee in the Eastern Oregon Light & Power Company, Baker, Ore., the name of Anna Gyllenberg, chairman of that committee, was added to the Northwest Women's Committee.

Spokane Women's Committee Studies First Aid

Here is the class in first aid of the Spokane Women's Committee of the Northwest Electric Light and Power Association. The girls of The Washington Water Power Company staff are practicing bandaging on L. E. Palmer, their instructor, who is a representative of the Red Cross organization. Eight members of the Women's Committee in Spokane qualified for certificates in the standard Red Cross first aid course. They are Mrs. Louise Bree, Miss Ruth Signor, Miss Janet Hodges, Miss Ingeborg Anderson, Miss Irene Lieberg, Miss Ruth Norris, Miss Estelle Shirley and Miss Mary K. Walsh.

Miss Olga Hazelton (shown in the inset), also a member of the Women's Committee, recently was awarded a Red Cross life-saving emblem when she qualified for the senior life-saving corps of that organization. Miss Hazelton is a member of the Washington utility's bookkeeping department.

Pacific Coast Electrical Association

Experience of Section Leaders Forecasts Excellent Results for Year

WORTHWHILE accomplishment for the current year of the Pacific Coast Electrical Association is forecast by the choice of section leaders, whose plans are already under way toward satisfactory fulfillment.

Activities of the **Accounting Section** are in charge of **E. N. Simmons**, general auditor, Los Angeles Gas and Electric Corporation, who has been employed by that company in various accounting and auditing positions since 1909. Mr. Simmons' association activities include service as member of the Budget Committee 1924-5, chairman of the Statistical Committee 1926-7 and vice-chairman of the Accounting Section for 1927.

The chairman of the **Advertising-Publicity Section** is **J. Charles Jordan**, since 1922 manager of the publicity department of the Pacific Gas and Electric Company. Mr. Jordan has been a member of the P.C.E.A. for about seven years and became an active member of the Advertising-Publicity Section during the reorganization period in 1924 when the standardization of the sec-

tion's activities first were contemplated. Last year he served as vice-chairman of the section. Mr. Jordan has been connected with the electrical industry for about twenty-two years and for all of that period with one company, for he entered the employ of the Pacific Gas and Electric Company in Oakland in 1905.

E. N. SIMMONS

W. C. McWhinney, assistant general commercial manager, Southern California Edison Company, is directing the work of the **Commercial Section.** Mr. McWhinney for many years has been interested in the work of the association and last year served as vice-chairman of the section and as chairman of the Power and Heating Committee. In addition to his P.C.E.A. duties he is also chairman of the Water Heater Committee of the N.E.L.A. Mr. McWhinney entered the electrical industry in 1909 as clerk in the stores department of the Pacific Light & Power Corporation, Los Angeles, and steadily worked up through the various departments until in 1917 he was appointed district sales manager. Following the merging of that organization with the Southern California Edison Company he successively has held the posts of assistant to the superintendent of sales, district manager at Lancaster, assistant superintendent of sales, and general business agent. In April, 1926, he was appointed to the position which he now holds.

J. CHARLES JORDAN

Guidance of the **Engineering Section** is in the hands of **C. F. Gilcrest,** who is superintendent of the meter department of the San Joaquin Light & Power Corporation, a post he has held since 1913. Mr. Gilcrest has served as a member of the Meter Committee since its organization in 1919 and in 1923-4 acted as chairman. Last year he served as vice-chairman of the Engineering Section. Following his graduation from the University of California in 1903 with a degree in electrical engineering, he became a member of the General Electric Company's testing department at Schenectady. After a short period of service as a power house attendant for the Pacific Gas and Electric Company, Mr. Gilcrest became an instructor in electrical engineering at the University of California, and remained there for eight years when he left to join the San Joaquin company as superintendent of the meter department.

W. C. McWHINNEY

Membership work is being handled by **Samuel H. Taylor,** who has been secretary of the Pacific Coast Electrical Association since 1920. For several years Mr. Taylor was general manager of the Electric Railway & Manufacturers' Supply Company in San Francisco, and he also has served as Pacific Coast representative of the Society for Electrical Development, Inc.

C. F. GILCREST

R. H. Ballard, vice-president and general manager, Southern California Edison Company, again guides the destinies of the **Public Policy Section.** Mr. Ballard's work in the electrical industry is too well known to need comment. He is a prominent figure not only in the Pacific Coast Electrical Association but in the National Electric Light Association, of which he is a past president. Last year he was chairman of that association's Public Policy Committee and is serving again in that capacity this year. Mr. Ballard is also a past president of the P.C.E.A. and for the past four years has been chairman of its Public Policy Section. Mr. Ballard began his electrical career as office boy for the Thomson-Houston Electric Company, predecessor of the General Electric Company, with which he also was connected, remaining in its employ until 1897. Following that he was for three years auditor of the Edison Electric Company, Los Angeles, and for four years office manager of the Butte Electric Power Company, Butte, Mont. Since 1904 he has been associated with the Southern California Edison Company.

S. H. TAYLOR

S. Waldo Coleman, president, Coast Counties Gas & Electric Company, who recently retired as president of the P.C.E.A., this year is directing the activities of the **Public Relations Section.** Mr. Coleman's familiarity with association affairs makes him an excellent leader for the section, for he has served not only as president but as vice-president, as a member of the Executive Committee of the association as well as of the Public Relations Section and as a member of the Public Policy Committee. Mr. Coleman's

R. H. BALLARD

career began as an employee in the shops of the General Electric Company at Schenectady, and continued as master mechanic for the Santa Rosa & Petaluma Railroad Company, as manager of the Union Traction Company, Santa Cruz, and as manager of the Coast Counties Gas & Electric Company, until in 1913 he became president of that company.

S. WALDO COLEMAN

The **Purchasing and Stores Section** has for its leader **C. D. Weiss,** superintendent of shops, stores and transportation for the San Diego Consolidated Gas & Electric Company, with which he has been affiliated since 1910. A member of the P.C.E.A. since 1914, Mr. Weiss entered into active committee work upon his appointment as a member of the Purchasing and Stores Committee in 1922, which was formed into a section in 1924. He served as chairman of that section last year also. Mr. Weiss also is active in the Transportation Section, which originally was organized as a bureau of the Purchasing and Stores Section, and he was appointed chairman of that bureau.

With a superintendent of transportation as its leader, namely, **P. H. Ducker,**

C. D. WEISS

who holds that position with the Southern California Edison Company, good results may be expected rom the **Transportation Section.** Mr. Ducker has been connected with association work since 1917 with particular interest in the Technical Section, until about two years ago when the Transportation Section was established he was appointed vice-chairman of the section. He continued in that capacity last year. The section is working toward the establishment of a national transportation section, as it is felt that, in view of the large expenditure of money in motor vehicles, member companies could derive a great benefit through the standardization and comparison of operating schemes, methods and new ideas. Mr. Ducker's service with the Southern California Edison Company dates back to 1905 when he entered its employ as a draftsman. Three years later he was placed in charge of its record department, and in 1912 when a transportation department was found necessary his training as mechanical engineer made him the logical man to be placed in charge of

P. H. DUCKER

that department. At that time the company was operating 59 automobiles; today the number has increased to more than 1,000 with a corresponding increase in responsibilities.

The women in the electrical industry on the Pacfiic Coast are represented by **Mrs. Ruth E. Creveling,** who is chairman of the **Woman's Committee.** Mrs. Creveling, who last year served as member at large on the committee, has developed a well planned program for the year's activities and already several enthusiastic meetings have been held. For the past four years Mrs. Creveling has been librarian for the San Diego Consolidated Gas & Electric Company. She is also chairman of the Women's Committee of the Pacific Coast Gas Association.

MRS. RUTH E. CREVELING

New Headquarters of the National Electric Light Association—Graybar Building, 420 Lexington Ave., New York, now is the address of the headquarters of the National Electric Light Association, formerly situated at 29 West 39th St., New York. The change in location has been made in order to house, on one floor and under one roof, all headquarters, departments and activities, in the interest of economic administration.

Group Meetings of the Commercial National Section, N.E.L.A., will be held Jan. 18-20 at the Edgewater Beach Hotel, Chicago. Reservations should be made directly with the hotel.

A. I. E. E.

Overhead Conductors' Movement Discussed at Meeting

At a recent meting of the Los Angeles Section, A.I.E.E., W. S. Peterson and H. B. McCracken, Jr., of the Los Angeles Bureau of Power and Light, discussed "Movements of Overhead Conductors During Short Circuits," an important problem on lines with increasing magnitude of power available for short circuits.

The authors of the paper made extensive actual physical tests and numerous calculations and presented valuable information showing the relationship between conductor size, conductor spacing, conductor tension, short-circuit current, span length, and conductor movement. The author's work is based upon a series of more than 300 actual tests made by the Bureau of Power and Light on full-sized conductors of various sizes at various spacings, spans, and tensions used in actual service.

Tests were conducted on two spans of single-phase line so ingeniously arranged that two separate observations could be made with each short circuit applied. Lights attached to the conductors enabled accurate photographic records to be taken showing the actual transverse paths followed by the conductors. The tests showed side motions of conductors ranging up to more than 30 ft. from the original position of the conductor and with only nominal short-circuit currents flowing.

Los Angeles Section Meetings—"High-Voltage Cable" will be discussed at the Section's dinner meeting to be held Jan. 10, and on Jan. 31 E. B. Craft, vice-president, Bell Telephone Laboratories, Inc., will speak on "The Direct Application of Research to the Problems of the Bell System." Both dinners will be served at 6:15 p.m. at the Los Angeles City Club.

Contractors, Dealers and Inspectors

Program for Northwest Inspectors Convention Announced

EVERYTHING is in readiness to entertain the inspectors of the Northweste Electrical Inspectors Association, to be held in Seattle Jan. 26-28. The Electric Club of Seattle is to play host to the visiting inspectors.

The convention is to open Thursday morning, following customary welcomes to the city, with the report of President Harry F. Jenkins, city electrician and inspector, Bellingham, Wash.

The complete program as given announcement by the association is as follows:

PROGRAM

Thursday, Jan. 26, 1928

Morning Session, 9:30 a.m.

1. Address of welcome on behalf of the city of Seattle—Mayor Landes.
2. Address of welcome on behalf of the Electric Club of Seattle—R. M. Boykin, president, Puget Sound Power & Light Company.
3. Response—John B. Fisken, consulting engineer, The Washington Water Power Company.
4. Roll call.
5. Secretary and treasurer's report.
6. President's address.
7. Appointment of special committees.
8. Announcements.

Electric Club Luncheon.

Afternoon Session, 2 p.m.

9. Paper: "Serving the Public"—W. A. Groce, assistant state fire marshal, Washington.
10. Paper: "The Service of Underwriters' Laboratories to the Electrical Inspector"—Dana Pierce, president, Underwriters' Laboratories.
11. Reports of standing committees.
12. Address: "Just a Talk"—By an old timer from the firing line, Earl Meacham, Meacham & Babcock, contractors, Seattle, Wash.

Special features of entertainment will be provided for the ladies. All members who desire to play golf can secure cards to any golf club in Seattle by applying to the golf committee, Messrs. R. E. Thatcher and E. J. Descamp.

Evening: Dance, Electric Club.

Friday, Jan. 27, 1928

Morning Session, 9:30 a.m.

13. Paper: "The Uniform Electrical Ordinace"—H. B. Kirkland, Society for Electrical Development, New York City.
14. Paper: J. A. Laing, vice-president, Pacific Power & Light Company, Portland, Ore.
15. Reports of standing committees.
16. Paper: "Regulation of Lighting and Appliance Loads"—L. W. Going, chief electrical inspector, Portland, Ore.
17. Paper: "Do We Need Reinspection?"—R E. Laing, city fire marshal, Seattle, Wash.

Afternoon Session, 2 p.m.

18. Paper: "Grounding"—S. W. Borden, grounding engineer, Crouse-Hinds Company, Syracuse, N. Y.

Entertainment and Stag Banquet, Olympic Hotel

Saturday, Jan. 28, 1928

Morning Session, 9:30 a.m.

19. Paper: "Is the Public Benefited by Municipal Control of Sale of Electrical Equipment?"—J. C. Caine, deputy electrical inspector, City of Portland, Ore.
20. Reports of standing committees.

Afternoon Session, 2 p.m.

21. Paper: "Neon Signs"—G. K. Comstock, engineer, Electrical Products Corporation, Seattle, Wash.
22. Question box, inspectors' problems, etc.
23. Unfinished business.
    Reports of temporary committee.
    Reports of resolutions committee.
24. New business.
25. Reports of nominating committee.
26. Election of officers.
27. Finis.

The Rowley Electric will be the name adopted by **C. A. Rowley**, of Pasadena, starting with the new year. This will replace the old name of **McNally Company** which has been used for over twenty years. The store is at 106 West Colorado Street.

Appliance Electric Service is the name of a new electric store and repair shop opened at 4264 South Broadway, Los Angeles. Special repair service on electric motors, appliances and radio, in addition to merchandising of new and used appliances, is handled.

California Inpectors' Convention Dates

Announcement of the dates chosen for the next annual convention of the California Association of Electrical Inspectors has been made by Claude Mitchell, secretary.

The convention will be held at Santa Barbara, March 22-24. The name of the hotel will be announced later and full information will be published in these columns.

E. C. Headrick, well known electrical contractor of Denver, Colo., was named a member of the executive committee of the Association of Electragists, International, to take office on Jan. 1, 1928, and serve for a period of two years. Mr. Headrick has been on the executive committee for the past two years.

Class Formed to Study National Electrical Code

Instructed to start an evening class for the purpose of studying the National Electrical Code and local codes, a committee was appointed by the Los Angeles Association of Electrical Contractors and Dealers at its membership meeting in December. The committee consists of M. L. Fish, Foulkes Electric Company, chairman; H. H. Walker and Duke Parker, Golden State Electric Company.

The class is to meet at the association rooms, 1009½ South Hill St., each Monday evening, beginning Jan. 9, from 7:30 to 9 o'clock.

Otto Wiemer, of the city electrical department, is to be the instructor. It is proposed to enlist the attendance of the superintendents, foremen and key journeymen of the contractors and go through the code systematically, giving especial attention to the requirements which are causing corrections upon electrical permits. There will be an opportunity for questions from the floor upon any rules which are not thoroughly understood.

Electragist Classes

A definite schedule of meetings for northern California to be made by the field representatives of the California Electragists during January and February has been announced by C. J. Geisbush, state manager. The schedule is as follows:

Monday, Jan. 16—San Luis Obispo.
Tuesday, Jan. 17—Watsonville.
Thursday, Jan. 19—San Jose.
Friday, Jan. 20—San Mateo.
Monday, Jan. 23—Oakland.
Wednesday, Jan. 25—Martinez.
Thursday, Jan. 26—San Rafael.
Friday, Jan. 27—Santa Rosa.
Monday, Jan. 30—Napa.
Tuesday, Jan. 31—Marysville.
Wednesday, Feb. 1—Corning.
Friday, Feb. 3—Dunsmuir.
Tuesday, Feb. 7—Sacramento.
Thursday, Feb. 9—Stockton.
Friday, Feb. 10—Modesto.
Monday, Feb. 13—Fresno.
Wednesday, Feb. 15—Visalia.
Friday, Feb. 17—Bakersfield.

New Leaders Chosen by California Electragists

Harry H. Walker, re-elected president of the California Electragists to succeed Clyde Chamblin to whom he turned over the office of president a year ago. Mr. Walker was urged to serve another term as president at the recent California Electragists' convention.

Eddie Martin, well known Electragist of San Francisco, was made vice-president of the California Electragists at the Riverside convention. Mr. Martin is assuming a number of responsibilities to assist Mr. Walker and is heading the activities of the Northern Division.

The George R. Cooley Electric Company of Seattle, formerly at 90 Columbia Street, has moved to more commodious quarters at 714 Fourth Avenue. The concern, which engages in electrical contracting, will make a specialty of flood and field lighting installations.

Carlson & Burroughs, Inc., a new electrical firm, has opened offices at 2020 Second Avenue, Seattle, and will engage in electrical contracting. **O. A. Carlson,** formerly head of the **O. A. Carlson Electric Company,** and **E. L. Burroughs,** compose the firm's personnel.

La Mesa Electric Company is a newly opened electrical store in a new store building in La Mesa, San Diego County, at 10 E. Lookout Avenue, and is operated by **George Howard** and **C. L. Grogan.** In addition to electrical contracting and appliance sales the firm carries a complete stock of radio sets and accessories.

Roy Kenney, general manager of the **NePage McKenny Company** at Portland, was a visitor recently of his brother **C. B. "Capt." Kenney,** manager of the same company, San Francisco. Roy Kenney is a member of the executive committee from District 1 of the newly formed **Oregon Electragists.**

New Santa Barbara Inspector Plans Convention Details

H. V. Dobson was recently appointed city electrical inspector for Santa Barbara, Calif., following the death of **R. Edwards** this spring.

Mr. Dobson has been identified with the electrical business for twenty-one years as inspector, contractor and journeyman. He received his early training at the army school at Fort Monroe, Va., and has a fund of practical experience gained from working for power companies, contracting, in marine installations, as journeyman and in government work. He was proprietor of the **Home Electric Company** of Stockton some years ago.

Mr. Dobson is already laying plans to entertain the California Association of Electrical Inspectors at its next annual convention to be held in Santa Barbara in March. Conferences have been held with **H. N. Beecher,** president of the association, and details of the arrangements are to be announced later.

Arthur Dahl recently announced the opening of a **Specialty Electrical and Radio Store** at 470 Sutter Street, San Francisco. The two major lines to be carried are radio and electric refrigerators. Arthur Dahl has been connected with **C. W. Dahl and Son** at 111 Mission Street, specialists in marine electrical installations. The Specialty and Radio Shop will be conducted as a separate merchandising institution.

S. E. Gamble has resigned as manager of the Oakland office of **Latourette-Fical Company,** mechanical and electrical contractors, of Sacramento and Oakland. Mr. Gamble formerly was connected with the Westinghouse Electric & Manufacturing Company.

Tom Bennett, estimator for the **Pacific Electric Construction Company,** recently resigned from that company to accept a position with the **American Electrical Engineering Company,** 1723 Polk Street, San Francisco.

Boy Scout Village Wired by San Diego Electrical Men

Electrical people of San Diego, under the leadership of the Electrical Contractors' Association, contributed the wiring of the official Boy Scout headquarters in San Diego, the old Indian Village of exposition days. Money was raised recently to repair the Indian Village but when the funds were found to be running low a Scout official asked the Electric Club of San Diego to aid in the electrical work at the village. As a result the wiring "bee" was held one Saturday and the work was completed.

Under the direction of Gill Cunningham, president of the Electrical Contractors' Association, and E. P. Kilcoyne, business manager of the Electrical Workers' Union, the job was accomplished in record time. Poles were set by the telephone company and services run between buildings by the San Diego Consolidated Gas & Electric Company, while the jobbers furnished materials at cost.

During the afternoon 100 gal. of lemonade, donated by Mr. Cunningham and made in a Savage washing machine lent by Earl Myers, was distributed to the workers.

In the picture at the left may be seen Gill Cunningham, president of the Electrical Contractors' Association, Elwood Barley, head of the Boy Scouts of San Diego, and E. P. Kilcoyne, business manager of the electrical workers. The right hand picture shows the group of electrical workers in front of one of the old Indian Village huts now used by the Boy Scouts.

Meetings

Coming Events

Artistic Lighting Equipment Association — Annual meeting — Winton Hotel, Cleveland, Ohio, Jan. 25-28, 1928.

California Electragists — Meeting of Northern Division at Sacramento, March 9-10, 1928.

Meeting of State Motor Section at Fresno, April 13-14, 1928.

California Electrical Inspectors—Annual convention at Santa Barbara, March 22-24, 1928.

National Electric Light Association—Group Meetings—Commercial National Section, Edgewater Beach Hotel, Chicago, Jan. 18-20, 1928.

Rocky Mountain Division—Meeting in Albuquerque, N. M., Feb. 14-16, 1928.

Northwest Association of Electrical Inspectors—Annual convention and electrical exhibition at Olympic Hotel, Seattle, Wash., Jan. 26-28, 1928.

Northwest Electric Light and Power Association.—Engineering Section—General meeting in Spokane, March 8-9, 1928.

Annual convention in Portland, June 19-22, 1928.

Pacific Coast Electrical Association.—Annual convention, Huntington Hotel, Pasadena, June 12-15, 1928.

Group meetings of Engineering Section at Clift Hotel, San Francisco, Jan. 11-13, 1928.

Meeting Purchasing and Stores Section—Los Angeles, in Los Angeles Gas and Electric Building, Feb. 16-17, 1928.

Electric Club Bowling League Adopts Rules for 1927-28

Rules and regulations for the conduct of the Los Angeles Electric Club's bowling league for 1927-28 were adopted at a recent meeting held in that city. J. A. Sines, of the Chicago Fuse Manufacturing Company, was elected president and treasurer, a position which he has held for the past three years.

The league is composed of twenty-four teams representing the following firms:

Western Light & Fixture Company, Graham Reynolds Electric Company, The Electric Corporation, Diamond Electric Manufacturing Company, Westinghouse Electric & Manufacturing Company, Los Angeles Railway Company, Manufacturers Agents No. 1, Golden State Electric Company, Los Angeles Department of Electricity, General Electric Company, Electrical Products Corporation, Listenwalter & Gough, Inc., Pacific States Electric Company, Illinois Electric Company, Keegan Electric Engineering Company, Newbery Electric Corporation, Southern California Edison Company, Los Angeles Gas and Electric Corporation, Los Angeles Department of Water and Power, Southern California Telephone Company, Pacific Electric Railway Company, Manufacturers Agents No. 2, J. A. Roebling's Sons Company, Kelman Electric Manufacturing Company.

Manufacturers' agents' team No. 1 represents:

Dietrich Joslyn Company, C. Dent Slaughter, J. J. Schaller Company, Appleton Electric Company, Dunlap Electric Company, Electric Sales Company, Chicago Fuse Manufacturing Company.

and manufacturers' agents' team No. 2 represents:

Clapp & Lamoree, Sierra Electric Company, J. G. Pomeroy Company, Wheeler Reflector Company, Thomas & Betts Company, Frank Adam Electric Company, Electric Sales Company.

The principal object of the league is to bring together the members of the different electrical organizatons for a few hours' sport and recreation each week and to promote wider acquaintance and friendship in the industry.

Radio Trade Association Elects Officers for New Term

At the annual meeting of the Pacific Radio Trade Association held in San Francisco, Ernest Ingold, president, Ernest Ingold, Inc., was re-elected president, J. W. Laughlin, director KPO, vice-president, and W. J. Aschenbrenner, secretary-treasurer, for the ensuing year. The board of directors consists of: George Campe, president, George Campe Company; C. B. Clendennin, manager, National Carbon Company; Don Gilman, manager, National Broadcasting Company; W. G. Kaemper, manager, Listenwalter & Gough; G. Harold Porter, Pacific Coast manager, Radio Corporation of America; Eric M. Unmack, president, Westwood Electric Company; Shirley Walker, assistant to the president, Sherman, Clay & Company; Ernest Ingold and J. W. Laughlin.

Staff Banquet of B. C. Company Is Attended by 300

Three hundred men of the office staff of the British Columbia Electric Railway Company, Ltd., Vancouver, attended the fifteenth annual banquet given recently by the company in the ballroom of the Hotel Vancouver. W. G. Murrin, vice-president, was in the chair in the absence of the president, George Kidd, who was in England.

Special selections and community singing enlivened the dinner, which was followed by an interesting program arranged by E. Rogers, assistant to the president. One of the novel features of the evening was the program, which was designed in the shape of an inside frosted lamp.

Northern Counties League Announces Personnel for 1928—Officers and directors of the Northern Counties Electrical Development League (California) chosen at a recent election for the year 1928 are as follows: president—A. E. Greiner, Corning; vice-president—Al Leibhardt, Willows; secretary-treasurer—Al White, Chico; directors—A. D. Woods, Redding; Don Bird, Chico; H. R. Jenkins, Corning; and Harry Lee, Red Bluff.

Officers Elected by Engineers' Club—At the annual election of the Engineers' Club of San Francisco the following officers were chosen for the ensuing year: president—G. R. Kingsland; first vice-president—C. E. Fleager; second vice-president—L. F. Leurey; secretary—E. N. Britton; treasurer—Arthur D. Oliver. Directors elected were E. J. Schneider and Edwin L. Oliver.

Party for Children Given by San Francisco League

More than 600 attended the annual Christmas party of the San Francisco Electrical Development League, whose special guests this year were the children of members and their friends. Luncheon was served in the gold ballroom of the Palace Hotel, which had been transformed into a wonderland of color through the use of special lighting, colored balloons, greens and two huge Christmas trees.

Community singing, led by Howard Milholland, announcer of KGO, was followed by a speech of thanks by Major Eastwood of the Salvation Army for the league's generous donation to the poor children in her care. The principal feature of the program, "Queen Christmas," a symbolical playlet, came next, and then the presentation of a box of candy to each child by a jolly Santa Claus ended the party.

Much credit is due Gene McCann who, as general chairman, had charge of arrangements; to Henry Bosch, chairman of the committee on properties and decoration; to M. S. Barnes, chairman of the committee on lighting, and his assistants, L. G. Gianini and J. R. Cravath; to R. A. Sharon, chairman of the reception committee; to the members who worked all the previous day decorating the room; and to all others who co-operated in making the affair the success that it was.

Utah Electrical League Elects Officers for 1928

The following members of the board of trustees of the Electrical League of Utah, Salt Lake City, recently were elected for the ensuing year: To represent the jobbers—J. A. Kahn, Capital Electric Company; H. R. Bygel, United Electric Supply Company; C. B. Hawley, Inter-Mountain Electric Company; J. M. Perlewitz, Graybar Electric Company.

Contractors and Dealers—G. W. Forsberg, Wasatch Electric Company; George R. Randall, Salt Lake Electric Supply Company; R. R. Reid, Reid Electric Company; J. C. Jacobs, Apex Electric Shop.

Manufacturers—B. C. J. Wheatlake, General Electric Company; W. A. Moser, Westinghouse Electric & Manufacturing Company; Thad J. Stevens, Stevens Sales Company; Ray Ackerman, Benjamin Electric Manufacturing Company.

Central Station—D. C. Green, H. M. Ferguson, C. A. Wolfrom, R. M. Bleak, all of Utah Power & Light Company.

Telephone Company—Miles R. Cahoon, Jr., Mountain States Telephone & Telegraph Company.

At a subsequent meeting the new board chose the following officers: president—R. M. Bleak, Utah Power & Light Company; vice-president—J. M. Perlewitz, Graybar Electric Company; secretary-treasurer—G. W. Forsberg, Wasatch Electric Company.

Personals

Central Station Man Joins Staff of Manufacturing Company

Roy Wilkins, formerly assistant engineer in the Division of Hydro-Electric and Transmission Engineering, Pacific Gas and Electric Company, San Francisco, has joined the staff of the Pacific Electric Manufacturing Company of that city in a consulting capacity, effective Jan. 1. Mr. Wilkins has been

ROY WILKINS

in the service of the central station company for the past fifteen years.

A graduate of the University of Kansas with the class of 1909, he received a post graduate degree of electrical engineer from Stanford University. His graduate studies covered a most comprehensive investigation and service tests of oil circuit breakers of various kinds. He is the author of numerous papers on hydro-electric and high-tension experiments, corona work and high-voltage oil circuit breakers.

After leaving college Mr. Wilkins entered the employ of the General Electric Company, Schenectady, where he spent two years in the testing and operating departments. In 1912 he went to San Francisco where he joined the organization of the Pacific Gas and Electric Company, spending the next eight years in the construction and operation departments. Upon the formation of that company's engineering department he became a member of the engineering staff. Mr. Wilkins always has taken an active part in the work of the Pacific Coast Electrical Association, in which he has served on the electrical apparatus, hydraulic power and overhead systems committees of the Engineering Section. He is also a member of the meter committee of the American Institute of Electrical Engineers.

H. J. Woodward, Northwest representative of the American Ironing Machine Company, Chicago, returned to Seattle not long ago after a sojourn of six months in San Francisco.

Charles F. Brush, of Cleveland, the man who gave New York its first commercial system of electric arc lights, recently made his first visit to the General Electric Company at Schenectady, where he was conducted on a tour of inspection through the laboratory and plant. In 1876 Mr. Brush began experimenting with the electric dynamo and arc lamp and in two years had a commercial system of arc lights on the market. Manufacturing was taken up by the Telegraph Supply Company of Cleveland, which was reorganized in 1880 as the Brush Electric Company. After a flourishing career of nine years it was acquired by the Thomson-Houston Electric Company of Boston and Lynn. Upon the consolidation of this company with the Edison General Electric Company to form the present General Electric Company, Mr. Brush retired from manufacturing to devote his entire time to research in his own laboratory.

S. R. Inch, formerly vice-president and general manager of the Utah Power & Light Company, Salt Lake, and now vice-president of the Electric Bond & Share Company, New York, recently made a visit to Cuba.

D. C. Green, vice-president and general manager, Utah Power & Light Company, and Sidney J. Jennings, president of the United States Fuel Company, have been appointed members from Utah of the American industry committee of the National Association of Manufacturers. This committee will draw up national planks to be submitted to both the Republican and Democratic parties at their conventions next year.

James W. Bancker, formerly comptroller of manufacture, Western Electric Company, recently was elected director of the company and vice-president in charge of purchases and traffic. He has been succeeded by **W. F. Hosford,** who has been connected with the organization since 1900. **David Levinger** has succeeded Mr. Hosford as engineer of manufacture, and **J. R. Shea** has been made superintendent of manufacturing development, the position formerly held by Mr. Levinger.

H. H. Hunt, director of Stone & Webster, Inc., **Donald C. Barnes,** now a vice-president of that concern and divisional manager at Boston, but until three years ago manager of the Seattle division of the Puget Sound Power & Light Company, and **H. A. Lemon,** personnel director for the firm, recently visited Seattle during an annual inspection trip. One of the purposes of the visit also was to formulate plans for the convention of Stone & Webster managers to be held in Seattle next July.

A. G. Griswold, president of the A.G. Manufacturing Company, Seattle, has received patents on a double-break, externally operated switch which he invented.

D. C. Green, vice-president and general manager, Utah Power & Light Company, Salt Lake, paid a visit to Los Angeles recently.

L. A. Engineers' Club Elects S. E. Gates President

Sam E. Gates, Los Angeles district manager for the General Electric Company, has been elected president of the Engineers' Club of that city.

Mr. Gates' interest in that club is but one of the many activities he finds time for in addition to the numerous duties of his position. He is prominent in the Los Angeles Electric Club, of which he is a past president, and he finds time for service in the Pacific Coast Electrical Association. This year he is a member of the general executive committee of that organization.

Before taking up his work in Los

SAM E. GATES

Angeles, Mr. Gates for fourteen years was in charge of the General Electric Company's office in Spokane. In that city he gave much time to civic affairs and was particularly active in the work of the Chamber of Commerce. During 1923 he served as chairman of its industrial bureau.

William Trapper, chief electrician for the Southern Pacific Company at its Sacramento shops, and as such the inventor of many electrical appliances used today in American railroading, recently was retired after a service of thirty-eight years. The engine headlights now used almost universally were invented by Mr. Trapper.

A. E. Holloway, superintendent commercial department, San Diego Consolidated Gas & Electric Company, has been elected a member of the board of directors of the San Diego Chamber of Commerce. Mr. Holloway was president of that body in 1925.

W. F. Brainerd, formerly with the California Electrical Bureau in Los Angeles, and more recently with the Miller Saw Trimmer Company, has returned to the electrical field and now is on the sales force of the Majestic Electric Appliance Company in Los Angeles.

A. W. Leonard, president, Puget Sound Power & Light Company, Seattle, was honored by being named Seattle's most popular office executive at the recent annual frolic of office executives and employees. About 6,000 stenographers and "bosses" attended the dance.

P. H. Craven Heads Utah Co.'s Idaho Falls Division

Percy H. Craven, for the past ten years district representative at Eureka, Utah, in the Provo Division of the Utah Power & Light Company, has been made manager of the company's Idaho Falls Division. He began his career in the electrical industry by joining the staff of the Knight Power Company as a surveyor. In 1912 he became associated with the Knight Consolidated Power Company as local manager at American Fork, Utah. The following year he was transferred to Provo, Utah, as chief clerk of the Provo division of the Utah Power & Light Company, and

PERCY H. CRAVEN

in 1918 went to Eureka as district representative. He also has spent some time in Alberta, Canada, as surveyor and as a member of the staff of the bureau of public works.

Mr. Craven is a past president of the Kiwanis Club at Eureka and lieutenant-governor of the southern Utah section of the Utah-Idaho district. He was the first president of the Eureka Chamber of Commerce.

Dr. W. D. Coolidge, assistant director of the research laboratory of the General Electric Company, has been awarded the Hughes medal by the Royal Society for "distinguished work on X-rays and the development of highly efficient apparatus for their production." The Hughes medal was presented first in 1913 to Dr. Alexander Graham Bell. Dr. Lrving Langmuir, also of the General Electric research laboratory, received it in 1918. Dr. Coolidge also has been awarded the Edison Medal by the Edison medal committee of the American Institute of Electrical Engineers "for his contributions to the incandescent electric lighting and the X-ray arts."

Morton B. Fowler, secretary-treasurer; **J. A. Cannon,** auditor; **J. M. Bourus,** assistant auditor; **G. N. Riblet,** auditor of stores; and **A. S. Brent,** auditor of special construction, respectively, San Diego Consolidated Gas & Electric Company, represented that company at the recent annual meeting of Byllesby accountants at Colorado Springs.

Arthur T. George, assistant attorney of the California Railroad Commission for the last two years has resigned to resume the practice of law in the city of Los Angeles and will be associated with the firm of Newlin & Ashburn in that city.

T. H. Hogg, chief hydraulic engineer, Hydro-Electric Power Commission of Ontario, recently was the recipient of the honorary degree of Doctor of Engineering from the University of Toronto.

Edward Heim, since January of this year assistant engineer in the office of the chief engineer, Utah Power & Light Company, has been made district representative at Eureka, Utah, succeeding Percy H. Craven, who has been made manager of the company's Idaho Falls division.

H. I. Diamond, president, the Holfast Rubber Company, Atlanta, Ga., recently made a tour of the Pacific Coast.

Frank E. Boyd, manager of motor sales, industrial department, General Electric Company, San Francisco, has returned to that city from an extended trip to the company's headquarters at Schenectady and to its various Eastern merchandising divisions.

A. E. MacInnis, founder and for the past seven years president of the Power Plant Engineering Company, Seattle, has left that city to become president and general manager of the Preferred Oil Burners, Inc., manufacturers of the Preferred-Hart Oil Burner, Peoria, Ill. **R. S. Whaley,** who has been vice-president and chief engineer of the Power Plant Engineering Company, has become president. Mr. MacInnis will retain his interest in the Power Plant Company.

Frederick A. Smith, district manager, Sutor & Company, San Francisco, has removed temporarily to Los Angeles where he personally will direct some of the engineering work for that company in southern California.

Sidney Z. Mitchell, president, Electric Bond & Share Company, New York, and chairman of its board of directors, recently was honored by the University of Alabama which conferred upon him the degree of doctor of laws. The ceremony took place at the dedication of the Alabama Power Company's hydro-electric development at Lock 18 on the Coosa River when the project was named Jordan Dam in honor of the mother of Mr. Mitchell and his brother, **Col. Leuben A. Mitchell,** vice-president, Alabama Power Company.

F. M. Tomlinson, chief engineer, Hydroil Sales Corporation, Lebanon, Ind., recently spent about six weeks on the Pacific Coast, the major portion of the time in Seattle, Portland, San Francisco and Los Angeles.

Morris B. Miller, son of **John B. Miller,** president of the Southern California Edison Company, was elected to membership on the board of directors of the Electrical Products Corporation of Arizona at the recent annual stockholders' meeting held in Phoenix. He succeeds **W. L. Stewart,** president of the Union Oil Company of California.

Electro-Kold Corporation Makes L. M. Simpson President

L. M. Simpson has been elected president and general manager of the Electro-Kold Corporation, Spokane. He succeeds as president **Dr. X. L. Anthony,** who has become chairman of the board of directors, and **C. L. Lewis,** former general manager, who has resigned to take care of personal affairs.

Mr. Simpson is well known in the electrical industry in the West. He was one of the founders of the Washington Electric Supply Company of Spokane, which recently was acquired by Westinghouse interests, and has been interested in development of the Grange-

L. M. SIMPSON

ville Power & Light Company, Grangeville, Idaho, Deschutes Power Company, Prineville, Ore., and Orofino Power & Light Company, all of which recently were sold to the Pacific Power & Light Company, Portland, Ore.

Harry S. Detrick, vice-president and general manager, Detrick-Joslyn Company, Los Angeles, recently returned to that city after an extended trip through the industrial centers of the eastern states in the interests of his firm.

W. H. Davie, vice-president and manager of the Los Angeles branch of Allied Industries, Inc., has returned from a trip to the Hawaiian Islands.

Obituary

Charles Northcutt, vice-president and general manager, Western States Gas & Electric Company, Stockton, and division manager, Pacific Gas and Electric Company, with headquarters in that city, died Dec. 17, 1927, as the result of injuries received in an automobile accident.

Jack Wilson, of Wilson's Electric Shop, Los Angeles, died recently in that city. Mr. Wilson had been engaged in the electrical business in Los Angeles for more than twenty-five years, and at one time served as secretary of the Los Angeles Electrical Contractors and Dealers Association.

Manufacturer & Distributor

Bowser Company Consolidates Western Departments

S. F. Bowser & Company, Inc., Fort Wayne, Ind., has announced that it has concentrated all of the departments in its Western division at its San Francisco headquarters, 425 Brannan St.

This includes the lubrication and filtration division, which formerly was handled independently by **Theo F. Dredge** as manufacturers' agent. Mr. Dredge has given up the other lines he represented and joined Bowser & Company as district manager of that division, with headquarters at the address given. **E. C. Marsh** is Western district manager for the company.

H. B. S. Agencies, Los Angeles, through their manager, **H. B. Squires,** have anounced that they have arranged with the **Wilboken Manufacturing Company,** of Milwaukee, to represent it in the State of California. Mr. Squires also has stated that his firm has been appointed by the **Federal Electric Company,** Chicago, to handle in the Pacific Coast teritory the products of its Specialty Division. **L. A. Blackburn,** who will act as Mr. Squires' associate in the San Francisco territory, has established temporary headquarters at 15 Moss Ave., Oakland, Calif. **H. M. Hudson,** who has been a member of the Squires San Francisco staff, has been placed in charge of the Seattle office.

Roth Brothers & Company have adopted a group insurance program for the benefit of its employees. With the exception of the supervisory staff, each worker receives $1,000 life insurance and weekly sick and accident benefits of $10. These latter payments are made when an employee is kept away from work due to sickness from any cause or an injury received while off the job and continue for a maximum of thirteen consecutive weeks.

The Vesta Battery Corporation, Chicago, has extended its original program of group life insurance to provide its employees with health and non-occupational accident insurance. The plan features the co-operative method of paying premiums. By this arrangement the employer jointly shares the cost with its employees.

Curtis Lighting, Inc., Chicago, announces the appointment of **Irving D. Smith** as resident engineer for the Dominion of Canada with offices at Union Trust Chambers, 105 Victoria St., Toronto, Ontario.

Appleton Electric Company, Chicago, has named **F. D. Good** its district manager in Seattle.

The Clark-Williams Engineering Company, Bridgeport, Conn., has been acquired by the **Malleable Iron Fittings Company** of Branford, Conn., according to a recent announcement. **Rolland G. Williams** has joined the staff of the Malleable Iron Fitings Company and the office of the former company has been moved from Bridgeport to Branford.

The Timken Roller Bearing Company, Canton, Ohio, and **M. B. U. Dewar** of London, England, jointly have purchased from Vickers, Ltd., all of the capital stock of **British Timken, Ltd.** Mr. Dewar has assumed active management of the affairs of British Timken, whose plant at Birmingham, England, is being enlarged.

Jack P. Davidson, Pacific Coast manager, Estate Stove Company, accompanied by **Sydney A. Beck,** its representative in the Northwest, recently left to attend a sales convention of the company to be held at Hamilton, Ohio.

George D. Lee, Pacific Coast manager, **Fitzgerald Manufacturing Company,** Torrington, Conn., recently left for a visit to the factory. On his return he expects to cover the Northwest territory.

J. G. Pomeroy Company of Los Angeles, San Francisco and Seattle, has added to the lines it presents throughout the entire Pacific Coast that of the **Erie Malleable Iron Company,** Erie, Pa.

The Packard Electric Company, Warren, Ohio, has announced that **C. J. Rhea** has joined its Chicago branch. He will assist **Howard Johnson,** manager of the Chicago territory.

Review of the Past Year and Outlook for Business in 1928

Gerard Swope, president of the General Electric Company, reviewing business conditions for the past year and commenting on the outlook for 1928, states:

"The electrical manufacturing business for 1927 has, on the whole, been satisfactory, and about the same in volume as the previous year. The use of electric current in homes and factories has increased 7 per cent over 1926 and, with the exception of 1921, has shown an increase each year since 1919 when the index was first prepared, and the consumption in 1927 was more than double what it was in 1919. This is becoming one of the best indices of general and industrial conditions in America.

"The outlook for 1928 is, on the whole, favorable. Economic conditions are sound and the satisfaction of the demand of 120,000,000 people should provide ample business activities with the usual attendant improvement in the art. Earnings of labor have never been so high, and with a continuance of good business their earnings should continue and employment become steadier."

The Burndy Engineering Company, Inc., New York, has been appointed as distributor of Everdur by the **American Brass Company.** The Burndy company will be represented on the Pacific Coast by its present representatives, **H. M. Thomas Company,** San Francisco, and **Bell & Slimmon,** Los Angeles.

Julius Andrae & Sons Company, Milwaukee, Wis., has acquired the wholesale electrical and radio business of the **Waterloo Electrical Supply Company,** Waterloo, Iowa, and will operate that concern as one of its branches.

The Yale Electric Corporation, Brooklyn, N. Y., is building a new plant in Jersey City. When completed it will be six stories high and occupy an entire city block.

Manufacturer Entertains Electric Club

The Pacific Coast Steel Company recently entertained about 100 members of the Seattle Electric Club at its electrified plant in Youngstown, Wash. After a tour of the plant under the guidance of **Leslie Knight,** assistant general manager, guests were served luncheon in the company's cafeteria. The group was photographed while at the plant.

Motor Manufacturing Company Formed in Los Angeles

Sterling Electric Motors, Inc. has been incorporated under the laws of California to manufacture a new line of electric motors, grinders, buffers and polishers. Offices have been established at 124 West Fourth St., Los Angeles, and a modern daylight factory is being erected on Telegraph Road at the corner of Atlantic Ave.

The following is the official personnel: president and general manager—**Carl E. Johnson**; vice-president—**J. M. Sharp**; secretary and chief engineer—**Earl E. Mendenhall**; treasurer and superintendent—**Allen A. Adams**; sales engineer—**Horace S. Walling.**

Artistic Lighting Equipment Association to Hold Annual Meeting—Jan. 25-28, 1928, Winton Hotel, Cleveland, Ohio, are the dates and place set for the annual meeting of the Artistic Lighting Equipment Association. At this meeting will be held the election of officers for the ensuing year, and the complete 1928 program of activities of the organization will be presented. This will embrace a refixturing and replacement campaign, designed to create a greater consciousness on the part of the public and the trade as to what constitutes modern, well designed lighting equipment, and to show its place in the artistic decoration of home or building. Complete details concerning the National Lighting Equipment Exhibition to be held in Chicago next June will be given.

Under the name of the **Lombard J. Smith Company**, Lombard J. Smith announces he is representing the **Crescent Truck Company, The Dielectric & Manufacturing Company, The Fansteel Products Company, The Foster Wyman Lumber Company, The Ideal Electric & Manufacturing Company**, the **Lehigh Structural Steel Company**, the **Kaniksu Cedar Company, The Royal Electric & Manufacturing Company**, and the **Veco Manufacturing Company** in California territory south of San Francisco and in Arizona, with headquarters at 324 North San Pedro St., Los Angeles.

Glo-Tube, Inc., a new concern, has opened a factory at S.175 Post St., Spokane, to manufacture and distribute Glo-Tube signs. **A. D. Lorraine** is president.

O. C. Johnson, sales manager, **Hoyt Heater Company**, Oakland, Calif., recently made a tour of the Pacific Coast territory between Bakersfield and the Canadian border.

Edison Electric Appliance Company, Inc., Chicago, has announced through **B. E. Rowley**, manager of its Salt Lake district, the establishment of a new Hotpoint factory branch service station at 1617 Lawrence St., Denver.

The Fem Company of the State of Delaware has been incorporated to take over the holdings of a partnership known as the **Fem Company** of Portland, Ore. Offices will be maintained in that city where manufacture of the company's piston electric washing machine will be continued. Officers of the company are: president—**Helen C. Watkins**; vice-president—**William D. Bennett**; and secretary-treasurer—**Frank H. McCune.**

The Electro-Kold Corporation, Spokane, is planning to begin production on a new electric refrigeration unit smaller than the standard models it now produces. A line of electric water coolers also is to be introduced, according to **H. L. Masterson.**

Wells-Gardner & Company, Chicago, and the **Precision Products Company**, Ann Arbor, Mich., have merged their radio manufacturing businesses and organized a new corporation known as the **Consolidated Radio Corporation.** Their present manufacturing plants will be continued but in future will be operated by the new corporation as two separate units, one as the Wells-Gardner Division and the other as the Arborphone Division.

The Leeds & Northrup Company, Philadelphia, has adopted an old age retirement plan for its employees. It differs from the average industrial pension system in having a guaranty given by the insurance company that every provision it contains will be fulfilled, and the employer has made a large deposit with the insurance company in order to make the retroactive provision of the contract effective.

The National Electrical Manufacturers Association, through its executive committee, recently elected **R. H. Goodwillie**, manager of the **Otis Elevator Company**, Yonkers, N. Y., treasurer to succeed **J. W. Perry**, formerly associated with **Johns-Manville Corporation**, who has retired from active business. **I. A. Bennett**, of the **National Metal Molding Company**, Pittsburgh, Pa., will succeed Mr. Perry as a member of the board of governors.

Curtis Lighting, Inc., Chicago, has suggested use of the word "optiphosis" as a term to classify any defect of vision, ailment of the eye, or pathological disarrangement in the sight which is caused by light. The word was introduced to the public at the annual convention of the Illuminating Engineering Society in Chicago.

The Arrow Electric Company, Hartford, Conn., has announced that **G. C. Barry**, formerly assistant to the vice-president in charge of sales, **American Brown Boveri Electric Corporation**, has become associated with the Arrow Electric Company.

Robbins & Myers Company Asks Appointment of Receiver

Wilbur J. Myers, appointed receiver of The Robbins & Myers Company, Springfield, Ohio, following an application for a receivership made after a meeting of the board of directors, has issued the following statement:

"For some time plans for reorganization of The Robbins & Myers Company have been considered, and as a part of any reorganization a receivership is necessary. It is hoped that the receivership of the company will be ultimately helpful rather than hurtful to the business of the company. The company's fixed charges for bond and other interest have been too heavy for its resources. Its goodwill and trade have been extensive and we hope they will continue and a reorganization may develop. The company owes no money in Springfield, the creditors being outside banks and firms. All payroll checks will be paid. It is hoped that creditors and security-holders will work together for a favorable outcome, and the employees and staff of the company can be counted on to give their best efforts to that end."

The Electrical Products Corporation of Seattle recently entertained in its new plant at 1000 Virginia Street the Advertising Club of Seattle. **J. D. Ross**, city light superintendent, explained the use of the Neon tube, which the company manufactures. **Philip MacBridge**, secretary of the corporation, was toastmaster. Other officials in attendance were **Hamilton Rolf**, president; **George Comstock**, vice-president and general manager; **Andrew Seers**, treasurer: **T. A. Mardon**, sales manager; **H. S. Ingold**, plant superintendent, and **Chase Chalton**, technician.

The Mountain Electric Company, Denver, has become a jobber of **General Electric Company** merchandise, according to announcement of **John J. Copper**, president of the Mountain company, who also has announced that **L. B. Johnson**, an electrical and illuminating engineer, formerly in the employ of the General Electric Company, has been added to the sales staff. There is no change in the ownership or management of the Mountain Electric Company.

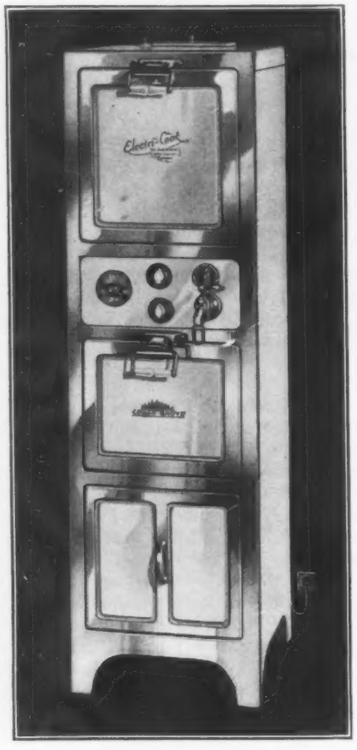
Taubman Automotive Company, Inc., which handles among other things radio and supplies and electrical appliances, has announced the opening of its New York office in Suite 408, General Motors Building. The executive and purchasing offices of the company still remain in the Taubman Building, 305 West Baltimore Street, Baltimore, Md.

Strimple & Gillette, Inc., 169 Jackson Street, Seattle, has been appointed Northwest representative of **M. S. Wright Company**, Worcester, Mass.

New Equipment

Automatic Floor-Plug Range

Electri-Cook is the name of an automatic **floor-plug range** which is being announced to the trade by the **Cedar Grove Stove Company**, Cedar Grove, Wis.



This range takes up no more space than the average filing cabinet, according to the manufacturer, and is equipped with two ovens, one for cooking and another for broiling, roasting and baking. One of its main features is its arrangement to supply hot water—enough for coffee, tea or other purposes—without the use of any additional current. It is finished in white with nickel trim.

Electric Ironer—The new Federal-Thor folding 40 **electric ironer** has been added to the line of Federal-Thor ironers, acording to announcement of the **Federal Electric Company**, 8700 South State St., Chicago. The Federal-Thor folding 40 is an entirely new type of electric ironer that irons everything a hand iron will iron in one-half the time or less, according to the Federal company. The four new achievements embodied in this ironer are, according to the company, enamelined shoe, Heat-Spread unit, Non-Pak roll, and noiseless operation.

Submersible Floodlight Projector.—A new **submersible, fountain-type projector** has been placed on the market by the **General Electric Company**, Schenectady, N. Y. The projector itself is constructed of non-ferrous material, with the door frame, casing and trunnion bracket of special aluminum alloy.

One of the special features of this projector is that it is not necessary to drain the water from the pool or fountain to service the lamp. It is equipped with a servicing device which consists of a large brass tube that screws into a brass plate, and a smaller tube, assembled to the trunnion bracket, which slides inside the larger tube. The projector may be lifted above the surface of the water for servicing.

Improvement in Ferrule Type Renewable Fuses—This improvement, announced by the **Trico Fuse Manufacturing Company**, Milwaukee, the company states, reduces the time spent in renewing fuses heretofore and eliminates all small, loose parts.

This is accomplished by an ingenious method of using spring retainers on the end caps to hold the end screws. There are now only two parts and the renewal elements. The general design of the fuse requires the removal of only one cap when renewing. This important improvement has been made in addition to the recent improvement on the knife-blade type fuse, according to the company.

A new non-battery design of light and power plant is being manufactured by the **Westinghouse Electric & Manufacturing Company** for furnishing light and power on farms, in oil and gas fields, air mail landing fields, ships and places where central station service is not available. It is also valuable for auxiliary electric service and for stand-by service. This new type of plant, Type E-86, is a non-battery, 2,000-watt, 110-volt plant, particularly adaptable where the use of batteries is not desirable. The new plant will develop 4 kw.-hr. of power on one gallon of fuel. It is air cooled, lubricated with the splash system and no electrical parts are exposed. This plant has a shipping weight of 695 lb.

Castings Replaced by Welded Steel Construction—Patents which were issued recently by the U.S. Patent Office to James F. Lincoln and assigned to **The Lincoln Electric Company** of Cleveland, include welded steel motor frames in which welded steel construction has replaced castings. The claims allowed for this method of construction, which is an assembly of hot rolled steel parts welded into the equivalent of a casting, cover its use only to dynamo electric machines. According to the statements of The Lincoln Electric Company's engineers, it is claimed that the welded steel method of construction gives a practically unbreakable frame, lighter weight and better ventilation.

Sign Reflector

A two-piece Isolux reflector for sign lighting has been announced by the **Wheeler Reflector Company**, 275 Congress St., Boston, Mass.

In its announcement the company states: "This construction requires no elbows, as the horizontal pipe screws directly into the canopy and special socket. The reflector is self-positioning, always facing the board directly. The different size units are interchangeable since they all fit a standard size canopy."

"Twist-Lock" Flush Receptacle

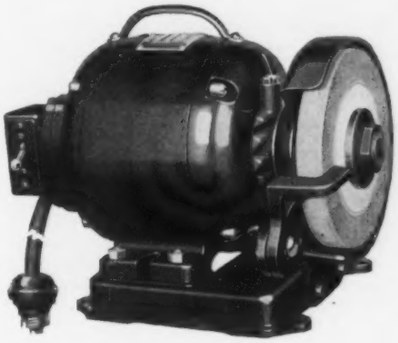
This is a new device placed on the market by **Harvey Hubbell, Inc.**, Bridgeport, Conn., which offers the assurance of permanent contact, according to the manufacturer, who states that the construction of the blades, combined with the locking feature, adds unlimited strength.

He adds: "Plug the cap into the receptable, give it a slight turn—and the two are securely locked together. A twist of the wrist and they are locked, a twist of the wrist and they are unlocked. This receptacle with a locking cap offers a decided advantage in industrial plants, garages, or other places where the cap is continually subjected to strain, severe service or constant vibration. These receptacles are rated 10 amp., 250 volts and are made with 3¼-in. and 4-in. covers."

Early American Lamps—A series of electric lamps in Early American, Pilgrim and Colonian designs has been introduced by **The Jefferson Glass Company**, Follansbee, W. Va.

Motor-Grinder

A combination **motor and grinder** has been placed on the market by **The Master Electric Company,** Linden and Master Aves., Dayton, Ohio. The manufacturer gives the following description of the product: "The unit can be belted either temporarily or permanently to a small drill press, jig saw, washing machine, lathe, churn, fan



or any other equipment for which a ¼-hp. split-phase motor is suitable. When operated in this way it makes a thoroughly dependable power unit. It can be used either as a portable or a permanently installed unit; it is rugged and built for long service; any broken part is easily replaced; it will do light grinding of all kinds; it will operate from an ordinary lamp socket, and it is compact. It can be used part of the time as a motor and part of the time as a grinder or it can be used for power and grinding at the same time." The motor is a Master type SA ¼-hp. Price for 60 cycle, a.c., 1,725 r.p.m. motor with grinding attachments complete, $21.

A Simplified Pyro Optical Pyrometer—This type of optical pyrometer offered by **The Pyrometer Instrument Company,** 74 Reade St., New York City, has all the features of the highest type precision instruments, the company states, together with compactness, ease of operation and weight. It is entirely self-contained and incorporates all parts necessary for accurate temperature readings in one small unit. The instrument is conveniently carried on a leather strap and is provided with a leather case. Weight of instrument, 3 lb.

Signal Gongs—Stanley & Patterson, 150 Varick St., New York City, have announced no-contact, "floating-on-line," Faraday Vibrating Signal-Gongs, manufactured in neck-pattern, under-dome-pattern and monitor-pattern. The company states that with a mechanism having no contacts, "floating-on-line," non-sparking, they are the most revolutionary line of a.c. gongs yet produced, that they are the most powerful signal gongs made for transformer or a.c. circuits, and will stand up under the hardest kind of service. **P. L. Hoadley,** with headquarters in Seattle, represents Stanley & Patterson in Oregon and Washington, and in California they are represented by **Clapp & La-Moree,** Los Angeles and San Francisco.

"Spraylite" Lamp—This is a new product recently announced by the **Silvray Company, Inc.,** 55 West 16th St., New York. It is a standard lamp, according to the company's statement, having a permanent reflector silvered directly upon it in such manner as to control efficiently the direction of light rays coming from the filament. With this lamp it is claimed that an increase up to 33⅓ per cent of light delivered on the working plane can be obtained, or an equal quantity of light from a lamp of lower wattage.

The Packard Electric Company, Warren, Ohio, has placed on the market a new line of indoor dry type **potential transformers** for instrument service.

Recent Publications

A Bigger Load.—Under this title pamphlet No. 12, published by the **Fullman Manufacturing Company,** Latrobe, Pa., sets forth the advantages of adequate house wiring, stresses the necessity for co-operation between electrical contractors, appliance dealers, central stations and jobbers in order to carry out effectively re-wiring and re-fixturing campaigns and describes as well the company's floor receptacles and table taps. The company states that electrical league managers may receive copies of this booklet for their members if they will ask for them and state the number desired.

Standard Junction and Joint Boxes—Under this title the **Standard Underground Cable Company,** Pittsburgh, Pa., has issued Bulletin No. 720-1. The different types of junctions and joint boxes manufactured by the company are described, and there are numerous illustrations and diagrams.

Scale Drawings Folio.—A 7-page folio giving scale drawings of high-tension equipment has been prepared by the **Delta-Star Electric Company,** 2400 Block, Fulton Street, Chicago. Electrical draftsmen should find these seven engineering sheets, which give scales of ⅛ in., 3/16 in., ¼ in., ⅜ in., ½ in., ¾ in. and 1 in. to the foot, useful in making out substation layouts. Copies will be mailed upon request.

Floodlighting. — "Floodlighting Including Searchlight and Airport Lighting," Bulletin GEA-161-A, published by the **General Electric Company,** Schenectady, N. Y., superseding GEA-161. Various types of floodlighting equipment are shown with numerous illustrations of applications. Included in the latter is a photograph of the San Joaquin Power Building in Fresno, Calif.

"Electricity—The Pathway of Prosperity."—This booklet recently published by the **Westinghouse Electric & Manufacturing Company** treats very broadly the economic problems of rural electrification. It presents an extentive discussion, with illustrations, of the uses of the electric motor as applied to the driving of corn shredders, ensilage cutters, threshing machines, feed grinders, corn shellers and miscellaneous farm tools. Also the use of electrical apparatus on the dairy farm, for milking machines, refrigeration, separators, churns, etc., is discussed as well as house lighting, electric cooking, washing and ironing by electricity.

Lead Tip Steel Pins for Insulators—This is the name of a 16-page booklet in color published by the **Ohio Brass Company,** Mansfield, Ohio. It treats of the importance of the pin to the insulator, with particular emphasis on the necessity for proper pin selection to provide the most efficient insulator service. The booklet also describes and lists O-B double arm construction materials and double pin pole top brackets. Copies may be obtained upon request to the company.

Outdoor Lighting Equipment and Lanterns—The Artistic Lighting Equipment Association, Graybar Building, New York City, has produced an interesting booklet on this subject showing various phases and applications of this type of lighting. It is profusely illustrated and indicates the artistic and decorative possibilities as well as utilitarian advantages and protective features of exterior lighting. Copies of the booklet will be mailed to architects, builders, designers, interior decorators, dealers, schools, colleges, public libraries or home-owners free upon request.

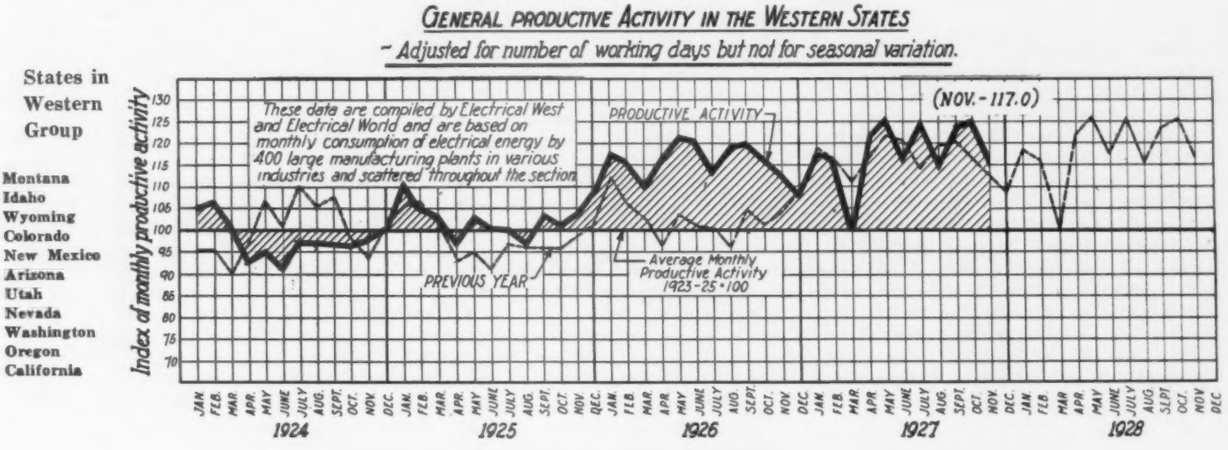
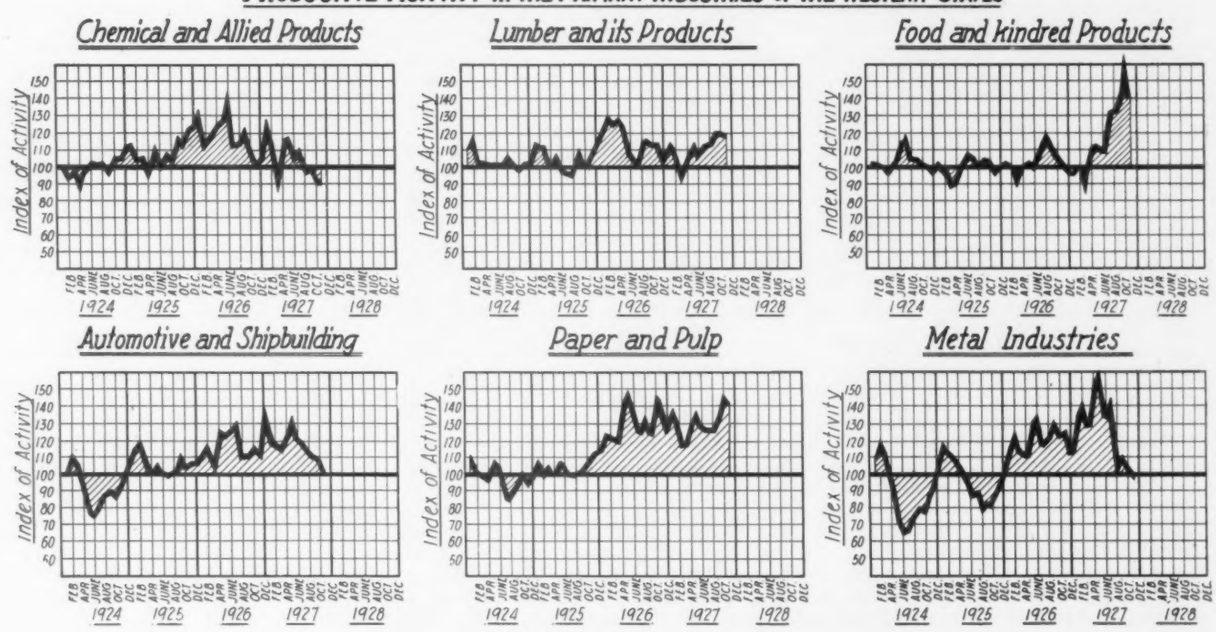
Nitralloy and the Nitriding Process—The Ludlum Steel Company, Watervliet, N. Y., has published under this title a treatise on the new Nitriding process for the hardening of steel. This process is patented and the company has acquired the rights to operate under United States patents. The treatise covers Nitralloy and the Nitriding process; the analyses of Nitralloy; the physical properties of Nitralloy; operations prior to Nitriding; the Nitriding process and equipment; and the properties of the Nitrided case.

Hotpoint Electric Servants.—This dealers' catalog No. G-5 for 1927-28 published by the **Edison Electric Appliance Company, Inc.,** 5600 West Taylor Street, Chicago, covers the Hotpoint electric servants, also ranges and water heaters, bakery, hotel and restaurant equipment. Catalog G-7 also published by the Edison company, covers the Edison electric cooking equipment for hotels, restaurants, bakeries, hospitals, clubs, public institutions and marine galleys.

ELECTRICAL WEST Barometer of Industrial Activity in Western States

IN ACCORDANCE with trends established in past years the manufacturing plants of the Western states reported a material decrease in the rate of operations during November. The rate of operations during that month was 6.8 per cent under October, but was 3.7 per cent over November, 1926. All of the primary industries of the section, except the stone, clay and glass industries, reported a drop in operations under those of October. Four of the industrial groups—chemicals and allied products, iron and steel, and metal working, paper and pulp and the shipbuilding industries—reported a rate of operations during November under that of November, 1926. On the other hand, two of the most important industries of the section—food and kindred products, and lumber and its products—reported operations materially over those of 1926. It is this ability of American industry to balance its general operations, so that, while some of the most basic industries are operating on a low plane, other industrial groups of equal importance are operating on a high plane, that constitutes one of the basic factors underlying our continued general prosperity. Such is the status of industrial activity in the Western states based upon the monthly electrical energy consumption of some 400 large manufacturing plants in various industries and operating in various portions of the section.

The index of activity in the manufacturing plants of the Western states stands at 117 for November as compared with 125.7 for October. Comparative indexes of productive activity referred to the monthly average activity for the three-year period 1923-25 as 100, and adjusted for number of working days are as follows:

November, 1927, Western states	117.0
October, 1927, Western states	125.7
September, 1927, Western states	124.6
November, 1926, Western states	112.8
Average, first six months, 1927, Western states	116.8
Average, full year, 1926, Western states	116.4
November, 1927, United States	115.2
November, 1926, United States	111.9

Nationally, the outstanding industrial factors on the horizon during November were the continued camparatively low operations of the rolling mills and steel plants as well as the ferrous and nonferrous metal working plants, the material drop in the operations of the textile industry, and the marked influence of replacement parts production upon the general operating conditions of the automobile industry, for while the number of new cars turned out during November was less than last year, the manufacture of replacement parts was 50 per cent over last year.